298

PROPERTY OF
L. T. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Elac (Miracord)	XA-100 Record changer	298-2
Fairchild	240	298-3
Firestone	4-B-77 (Code 120-5-C325)	298-4
General Electric	645, 646, 647, 648	298-5
Hallicrafters	21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D) Tel. Rec.	298-6
Meteor	4104 (Ch. 528.37000), 4121 (Ch. 528.37100) Tel. Rec.	298-7
Philco	24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354) Tel. Rec.	298-8
Pilot	PA-913	298-9
H. H. Scott	120-CP	298-10
H. H. Scott	210C	298-11
Sparton	10T201 (Ch. 22V174), 11T209, 11T309, 12A203, 12A209, 12A309, 14A203 (Ch. 22V214) Tel. Rec. Prod. Chg. Bul. 138	298-1
Truetone	2D1430D, E, 2D2433B Tel. Rec.	298-12
Westinghouse	H-511P4, H-512P4 (Ch. V-2237-2)	298-13
Zenith	T545 (Ch. 5T04)	298-14

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 14 IN SET 255

SPARTON MODELS 10T201 (Ch. 22V174), 11T209, 11T309, 12A203, 12A209, 12A309, 14A203 (Ch. 22V214).

Sparton models 11T201, 12A204, 12A210 and 14A204 (Chassis 23U214) were covered in Photofact Folder 14 – Set 255.

Models 10T201 (Chassis 22V174), 11T209, 11T309, 12A203, 12A209, 12A309 and 14A203 (Chassis 22V214) are electrically identical except a different tuner is incorporated.

A schematic of this new tuner is given on the reverse side. Alignment procedure is given below.

PRODUCTION CHANGES
BULLETIN 138

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to the video IF AGC line. Connect the positive lead to chassis.
The channel oscillator adjustment screws are reached thru a hole just above and slightly to the right of the fine tuning shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to pin 2 of V7. Low side to chassis.	A1	Adjust to place sound marker in trap notch as in Fig. 1. Video marker should be at 50%.
		207MC (10MC Swp)	205.25MC 209.75MC	12		A2	
		201MC (10MC Swp)	199.25MC 207.75MC	11		A3	
		195MC (10MC Swp)	193.25MC 197.75MC	10		A4	
		189MC (10MC Swp)	187.25MC 191.75MC	9		A5	
		183MC (10MC Swp)	181.25MC 185.75MC	8		A6	
		177MC (10MC Swp)	175.25MC 179.75MC	7		A7	
		85MC (10MC Swp)	83.25MC 87.75MC	6		A8	
		79MC (10MC Swp)	77.25MC 81.75MC	5		A9	
		69MC (10MC Swp)	67.25MC 71.75MC	4		A10	
		63MC (10MC Swp)	61.25MC 65.75MC	3		A11	
		57MC (10MC Swp)	55.25MC 59.75MC	2		A12	

VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

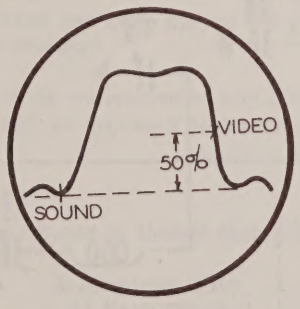
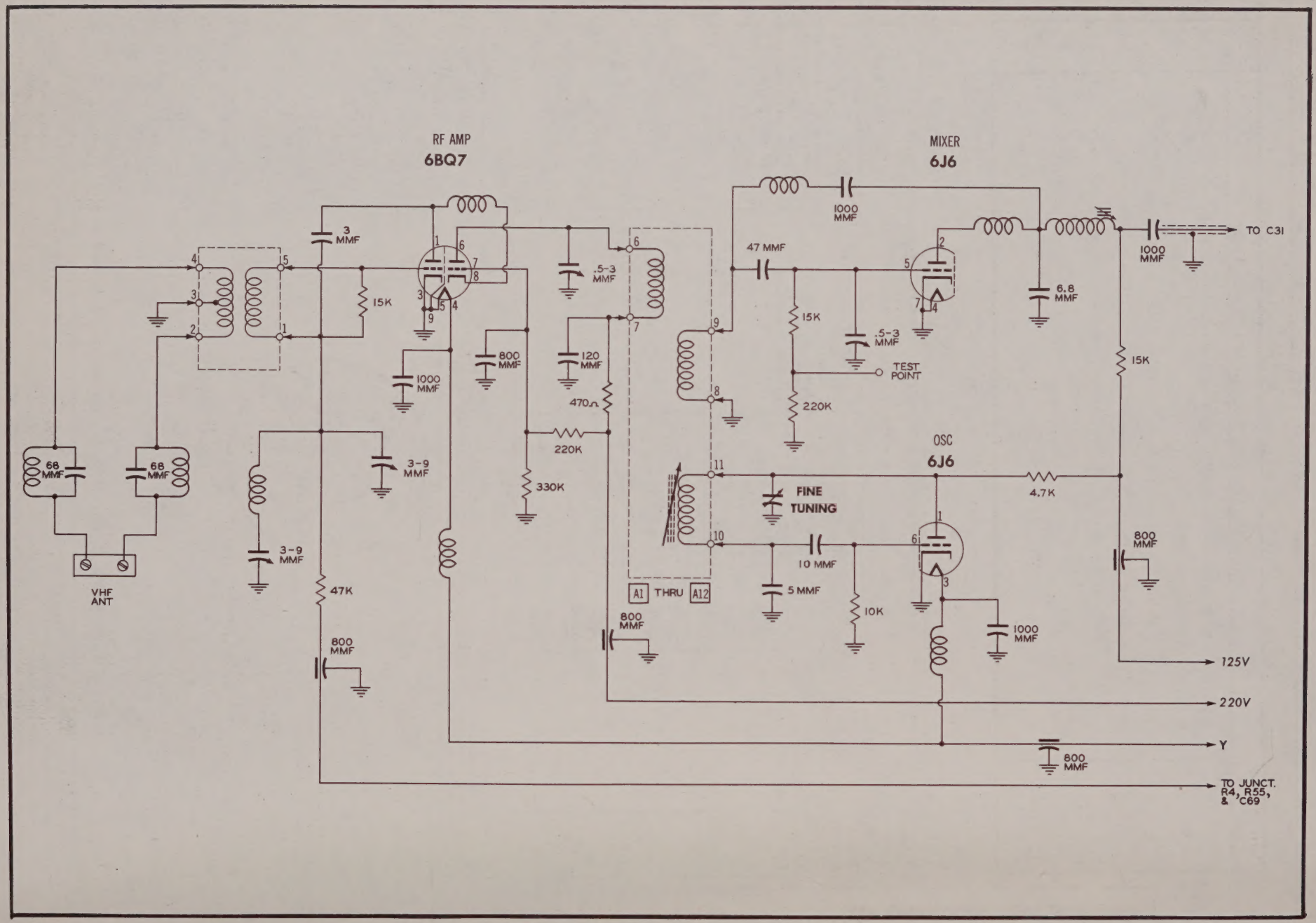


FIG. 1

PROPERTY OF
L. F. BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


RF AMP
6BQ7
MIXER
6J6
OSC
6J6
3 MMF
15K
.5-3 MMF
1000 MMF
800 MMF
120 MMF
470Ω
220K
330K
68 MMF
68 MMF
3-9 MMF
3-9 MMF
VHF ANT
47K
800 MMF
A1 THRU A12
800 MMF
1000 MMF
47 MMF
15K
.5-3 MMF
TEST POINT
220K
6.8 MMF
1000 MMF
TO C31
15K
FINE TUNING
4.7K
10 MMF
5 MMF
10K
800 MMF
1000 MMF
125V
220V
Y
800 MMF
TO JUNCT. R4, R55, & C69

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ELAC (Miracord)
MODEL XA-100

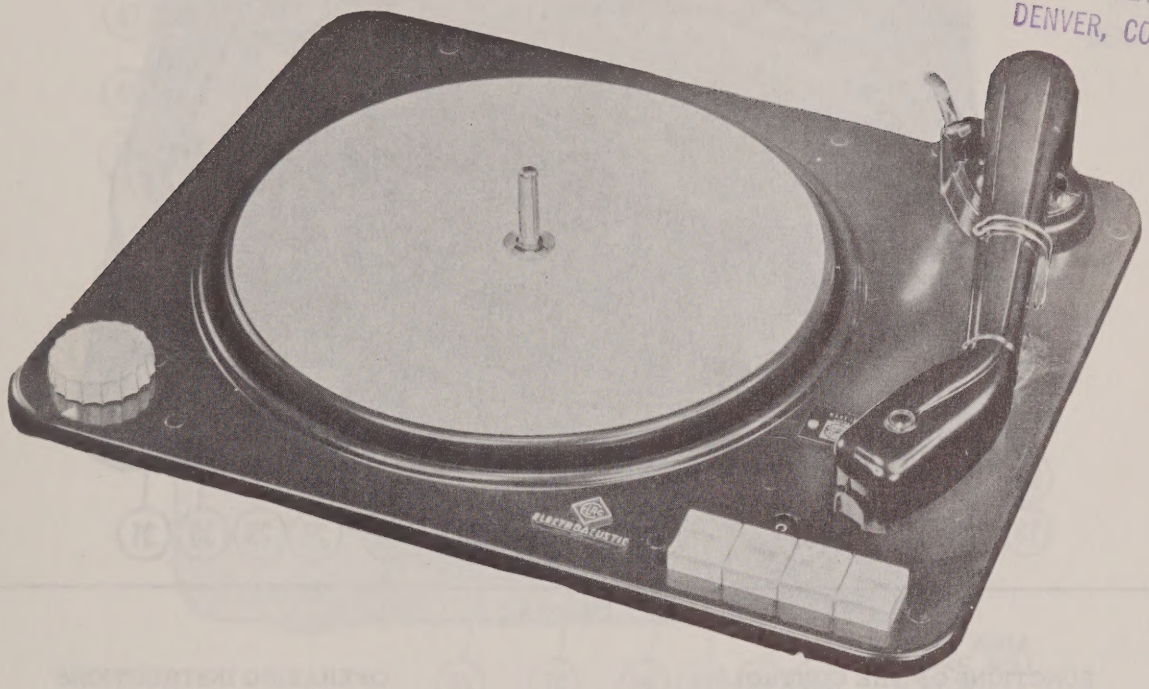


Figure 1

GENERAL INFORMATION

The Elac Model XA-100 Record Changer is designed to play in automatic sequence a stack of records and shut off after playing of the last record.

As many as eight 12", ten 10", or any assortment of 10" and 12" records (providing they are of the same speed and same type of groove) may be intermixed in any order. The stack of records should not exceed 7/8" in height, the limit being indicated by three white marks at the top end of the spindle.

A stack of ten 7", 45 R. P. M. records (with the use of a "45" adaptor spindle which is available as an accessory) will also play and be automatically changed on this machine.

After the last record of a stack has been played the pick-up arm is returned to the rest post and automatically shuts off the changer.

This record changer must not be connected to any other than A. C. supply. It is adapted for 110 or 220 volt A. C. supply and is adjusted to be operated on 110 volts when leaving the factory.

Distributed in United States by:

Audiogersh Corp.
23 Park Place
New York 7, New York

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA

Copyright 1955 • All Rights Reserved

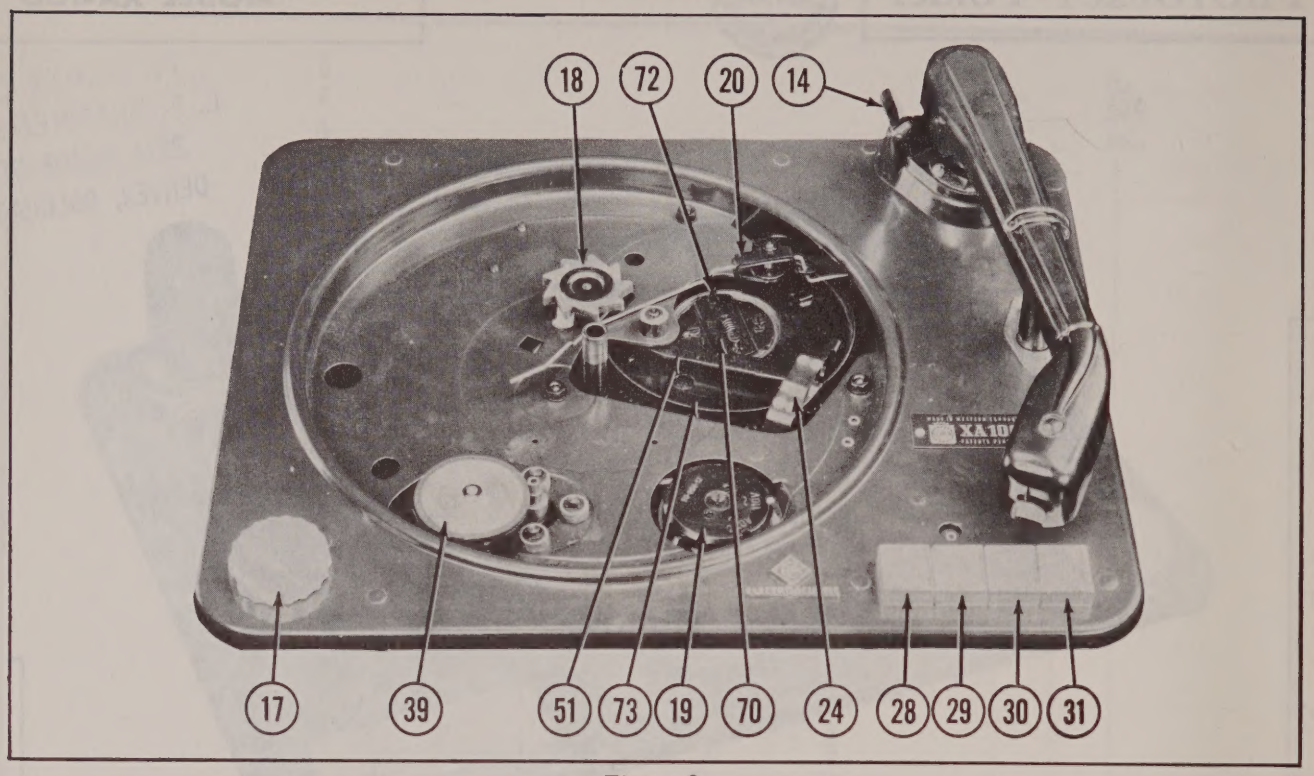


Figure 2

FUNCTIONS OF THE CONTROLS

Start Button: Depressing this button starts the changer into automatic operation. A record may also be rejected at any time by pressing this button.

Filter Button: Depressing this button will help suppress surface noise caused by old records.

Pause Button: Through the use of this button the changer can automatically be set for a time lapse between the changing of each record. The interval position is indicated at a small window directly above the "Pause" button and the figures as shown in the chart below allow settings anywhere from 5 seconds to 5 minutes.

SETTINGS					
R. P. M.	0	1	2	3	4
78	5sec.	35sec.	70sec.	105sec.	140sec.
45	9sec.	60sec.	120sec.	180sec.	240sec.
33 1/3	12sec.	82sec.	164sec.	246sec.	328sec.

Repeat: By using this button the whole or part of any record can be repeated at any time.

Speed Control Knob: The speed control knob determines the turntable speed and automatically sets the mechanism for the 7" or 10" set-down.

Note: When the changer is not in use, the speed control knob should be placed in one of the "o" positions to prevent flat spots from developing on the idler wheel tire.

OPERATING INSTRUCTIONS

Loading-

Place a stack of eight 12" or ten 10" records (or a corresponding mixture of both) or ten 7" records on the spindle and gently lower to the three protruding fingers on the spindle.

Note: When intermixing records, they must be of the same speed and same type of groove.

Starting-

To start the machine, after checking that the stylus and speed controls are in the position corresponding to the type records to be played, press the "Start" button, hold momentarily, and release. The changer will operate automatically until the last record has been played, at which time, the pick-up arm is returned to its rest and the supply to the motor is switched off.

Rejecting-

A record may be rejected at any time by depressing the "Start" button.

Stopping-

The changer may be stopped at any time by gently lifting the pick-up arm and placing it on its rest .

Using Changer As Automatic Record Player-

Instead of the changer spindle, insert the "Single Play Spindle" into the center hole of the turntable and place the record to be played on the turntable. When playing a 12" record, its edge will automatically touch

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

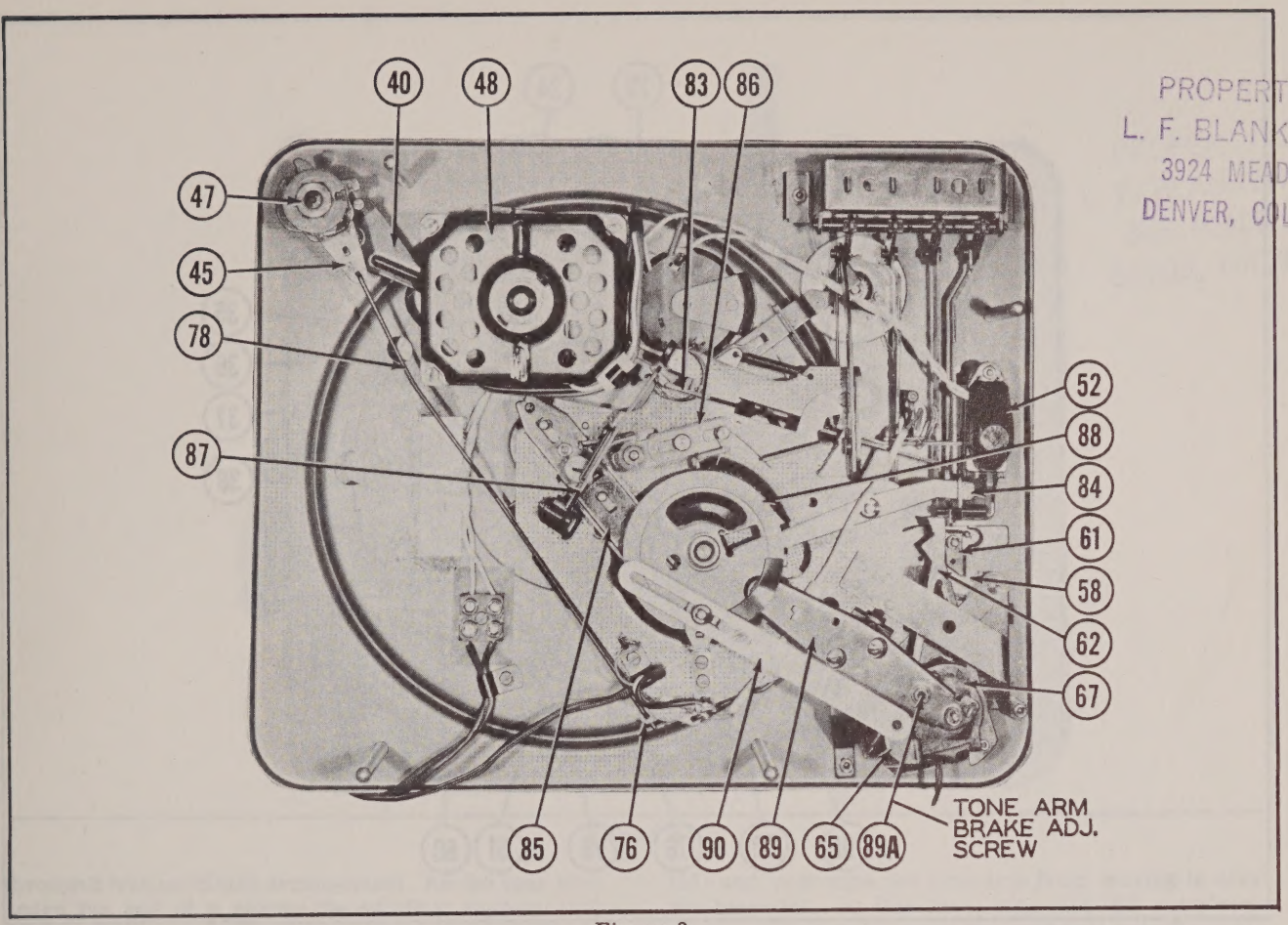


Figure 3

scanning lever (14) which sets the mechanism for the 12" set-down position.

To play a 7" record with a 1 1/2" center hole , place the "Puck" on the "Single Play Spindle" engaging it in the three humps on the rubber turntable mat.

Operate the changer as previously described and when the record has been played the pick-up arm will return to its rest and the instrument will shut off automatically.

Continuous Repetition-

The changer will automatically keep playing the same record if the single play spindle (2) is inserted inversely. The changer is switched off by manually returning the arm to its rest.

CHANGE CYCLE

It is recommended that the change cycle operation be observed while rotating the turntable by hand . The action described below can then be readily followed and the function of each part more easily understood.

Process To Start Record Changing: The process of record changing is initiated via the starting lever (84) which is actuated when the "Start" button is depressed , or by weighted segment (62) when the stylus moves into the trip groove after the record has been played to the finish.

Drive: The changer is driven by a synchronous A. C. motor (48), on the shaft of which a 3-step drive pulley is mounted. The idler wheel (39) is adjusted to ride on different steps of the drive pulley by the idler pivot lever (40) and the speed change worm (42) when the speed control knob (17) is actuated.

The idler wheel (39) is arranged between the motor drive pulley and turntable rim and is held in firm contact with these parts by idler tension spring (23) to drive the turntable at a constant speed.

To prevent flat spots from developing on the idler wheel (39), when the changer is not in use, it is pulled away from the motor pulley when speed control knob (17) is placed in one of the "o" positions.

Functions Of Cycling Mechanism: Depressing the "Start" button causes the start link (35) to simultaneously actuate line switch (52) and start lever (84). As start lever (84) is actuated it contacts and moves the cycle starting catch (81) so as to move the rubber bumper on the end of catch (81) into contact with the lower driving surface on the turntable hub. The contact between the rubber bumper on cycle starting catch (81) and the turntable hub gives the necessary push for the teeth in cogwheel (80) to engage the teeth in the turntable hub, thus, causing cogwheel (80) and cam disk (88) to rotate. As cam disk (88) starts to rotate the tone arm control lever (89) rides up an incline on the outer edge of the cam disk to raise the tone arm. At this time, an eccentric mounted pin on cam disk (88) engages the tone arm control coupling rod (90), which in turn, actuates the tone arm actuating lever (65) to move the tone arm out away from the turntable.

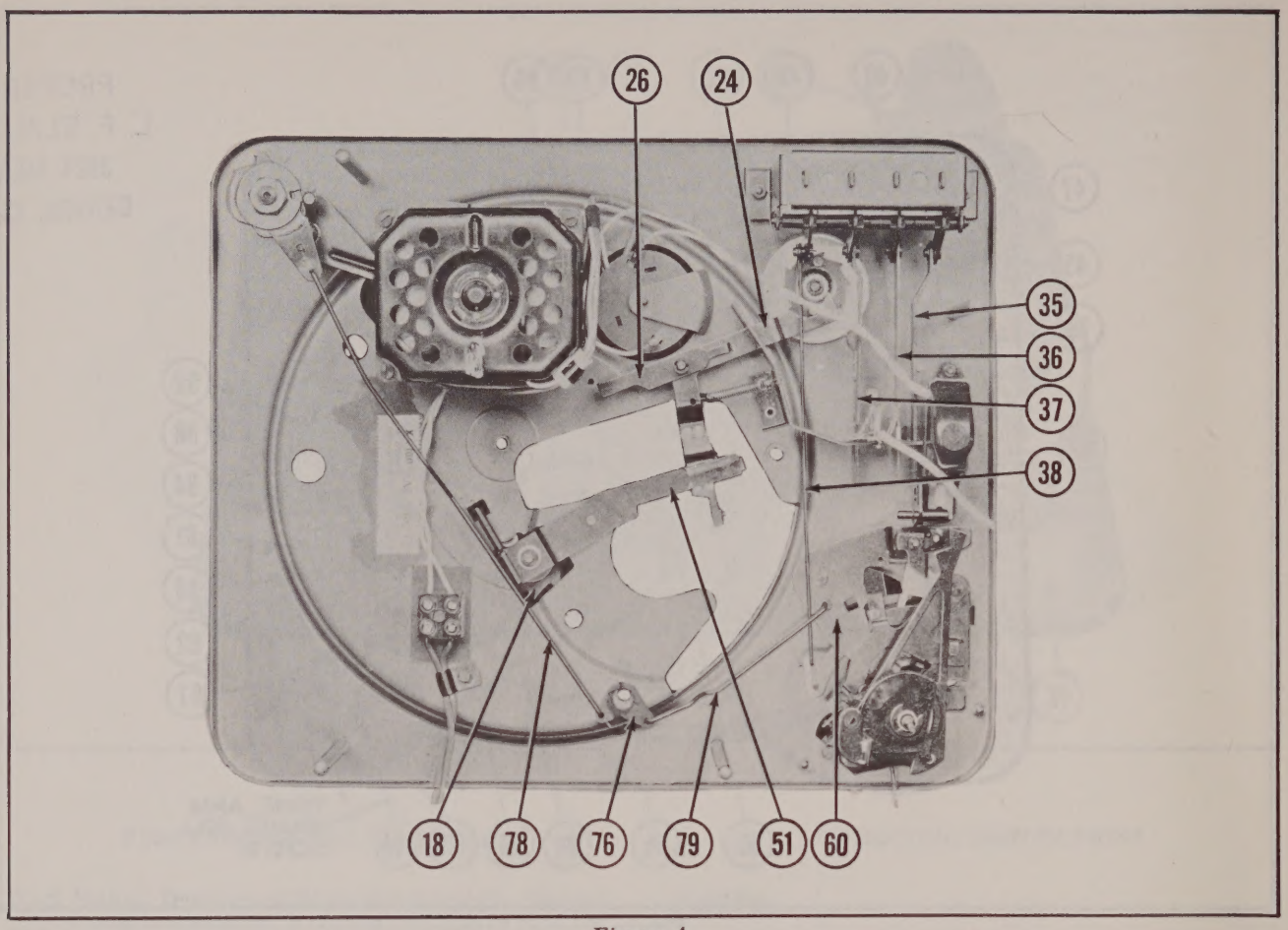


Figure 4

When the tone arm has reached its farthest outward excursion the cam disk (88), by reason of its contour, contacts and moves the spindle actuating lever (85) forward far enough to engage with the bottom end of the record spindle (1). The adjustment screw on the rear of the spindle actuating lever (85) now rides up the inclined cam surface on cam disk (88) and in so doing pivots the front of spindle actuating lever (85) downward to actuate the record spindle (1). This drops the bottom record of a stack, resting on the record spindle, to the turntable.

The tone arm adjusts itself to the size records being changed by the stop dog plate (60) which is provided with two levers. One is the 7" slide plate (57) which controls the 7" and 10" set-down positions and the other is the 12" stop dog (63) which controls the 12" set-down position. 7" slide lever (57) is moved into position for 7" records via a rod system (78 and 79) when the speed control is placed in the 45" position.

Tracer lever (58), which is coupled directly to the tone arm support mechanism and therefore moves in unison with the tone arm, directs the in-movement of the tone arm to one of the three set-down positions.

When 7" records are being changed and the changer is in the 45 R. P. M. speed position, the turned down nose on tracer lever (58) slides up the incline and over the top of 7" slide lever (57). After sliding over the top of the 7" slide lever the turned down nose on tracer lever (58) drops into a square hole in the stop dog plate (60), stopping the inward travel of the tone arm with the stylus positioned directly over the lead-in groove of the 7" record.

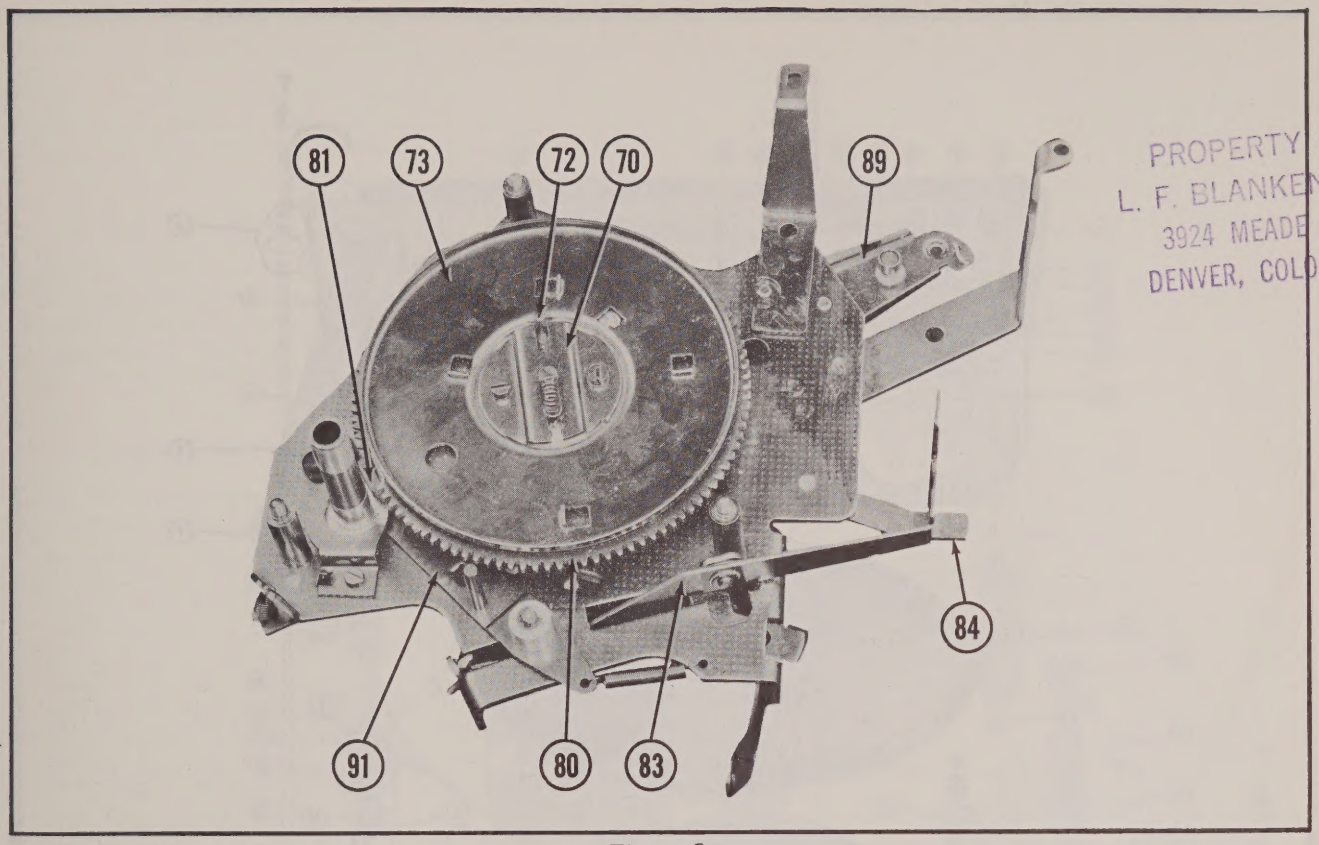
When 10" records are being changed and the changer is in the "33" or "78" speed position, the 7" slide lever (57) is pivoted toward the front of the changer. Consequently, the tracer lever (58) fails to make contact with the 7" slide lever (57) as the tone arm moves inward. The turned down nose on tracer lever (58) moves behind the 7" slide lever (57) and comes to rest against the stop dog plate (60). This positions the stylus directly above the lead-in groove of the 10" record.

When a 12" record drops to the turntable it strikes the spring-loaded scanning lever (14), which in turn, pushes the 12" stop dog (63) in front of the turned down nose on the tracer lever (58). As the tone arm moves in toward the record the turned down nose on the tracer lever (58) comes to rest against the 12" stop dog, stopping the inward movement of the tone arm, which positions the stylus directly above the lead-in groove of the 12" record.

At this time, the tone arm control lever (89) rides down the cam surface on the outer edge of cam disk (88) and lowers the tone arm onto the record. This same action raises the tracer lever (58) out of engagement with the set-down stop dog that it is engaged with, permitting the tone arm to ride freely across the record.

Cogwheel (80) and cam disk (88) have now completed their rotation and the "open gap" in the cogwheel teeth faces the pinion gear on the turntable hub, thus completing this phase of the change cycle.

As the stylus moves across the record, the weighted segment (62) moves inward with the tone arm



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

Figure 5

through a friction clutch arrangement. As the tone arm nears the end of a record the weighted segment (62) strikes the cycle starting catch (81) and moves it until the rubber bumper on its end moves to within .016" of the turntable hub. At this time the weighted segment (62) also contacts the recoil lever (20). The pin on the underside of the turntable, located nearest the hub, strikes the recoil lever (20) on each revolution of the turntable and the recoil lever, in turn, strikes and moves the weighted segment (62) back away from the starting catch (81). This action takes place during each revolution of the turntable until the stylus reaches the end of a record, at which time, the stylus enters the lead-out groove and the tone arm accelerates rapidly. This rapid acceleration causes the weighted segment (62) to move far enough and fast enough to push the cycle starting catch (81) and its rubber bumper into contact with the lower driving surface on the turntable hub. The contact between the rubber bumper on cycle starting catch (81) and the turntable hub gives the necessary push for the teeth in cogwheel (80) to engage with the teeth on the turntable hub and thus, start a new change cycle.

Again, the mechanism follows the preceding sequence of cycling and playing the records until the last record of the stack has been played.

Automatic Shut-Off Process: When the last record drops, the three expanding fingers at the top of the record spindle are not restrained by the center hole of a record. This action allows the "wire" at the bottom of the record spindle to be pulled down farther than when records are resting on the spindle. The down-movement of the "wire" on the bottom of the record spindle is transmitted to the ratchet lever (61) by action of the switch-off lever (83) and the shut-off lever (87). When the tone arm swings out, ratchet lever (61) engages with the notch in the front of the tracer lever (58) and restrains the tone arm from moving in over the turntable. At this time, cam disk (88) completes its revolution and lowers the tone arm onto its rest, which, in turn, disconnects the line switch (52).

Functions Of The Pause Mechanism: Pauses are introduced between records only when the pause mechanism is switched on, (positions 1 to 4). This process is carried out by the tooth segment located on the underside of cogwheel (80). This tooth segment is moved inwards, making a gap in the cogwheel teeth (80), by the pause gap actuating lever (91).

Interval disk (73) has four stop dogs on its top side which stop the disk at a certain angle of arc, depending on the position of pause lever (24), which is actuated by the pause push button. When the "pause gap" is open, stopping the rotation of cogwheel (80), rubber cogwheel (18) is pivoted by the pause drive axle lever (51), which, in turn, is pivoted by slide piece (72). This moves the pause drive ring (49), located on the shaft of rubber cogwheel (18), against the rim of interval disk (73).

During each revolution of the turntable the outermost pin on the underside of the turntable strikes and moves rubber cogwheel (18) which causes interval disk (73) to slowly follow the rotation through action of the pause drive ring (49). The interval disk (73) now strikes a catch bolt on cogwheel (80), turns same, thus bridging the "pause gap" permitting the changer to continue on through its cycle.

Functions Of The Repeat Mechanism: When the "Repeat" button is depressed, spindle actuating lever (85) is blocked by the repeat bar (86) resulting in the record spindle (1) not being actuated when the mechanism goes through its cycle. An instant before cam disk (88)

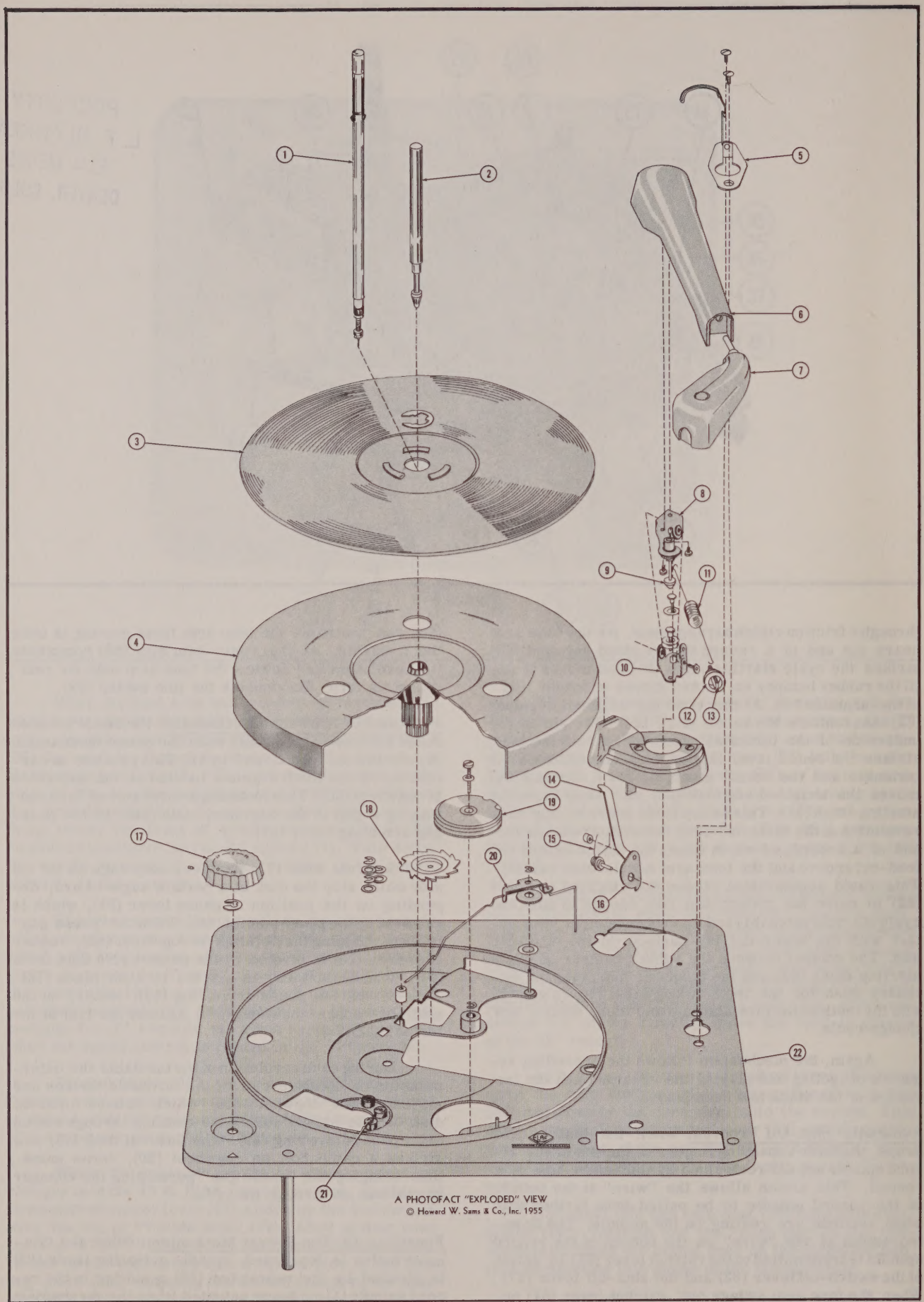


Figure 6A. Exploded View Of Parts Above Baseplate.

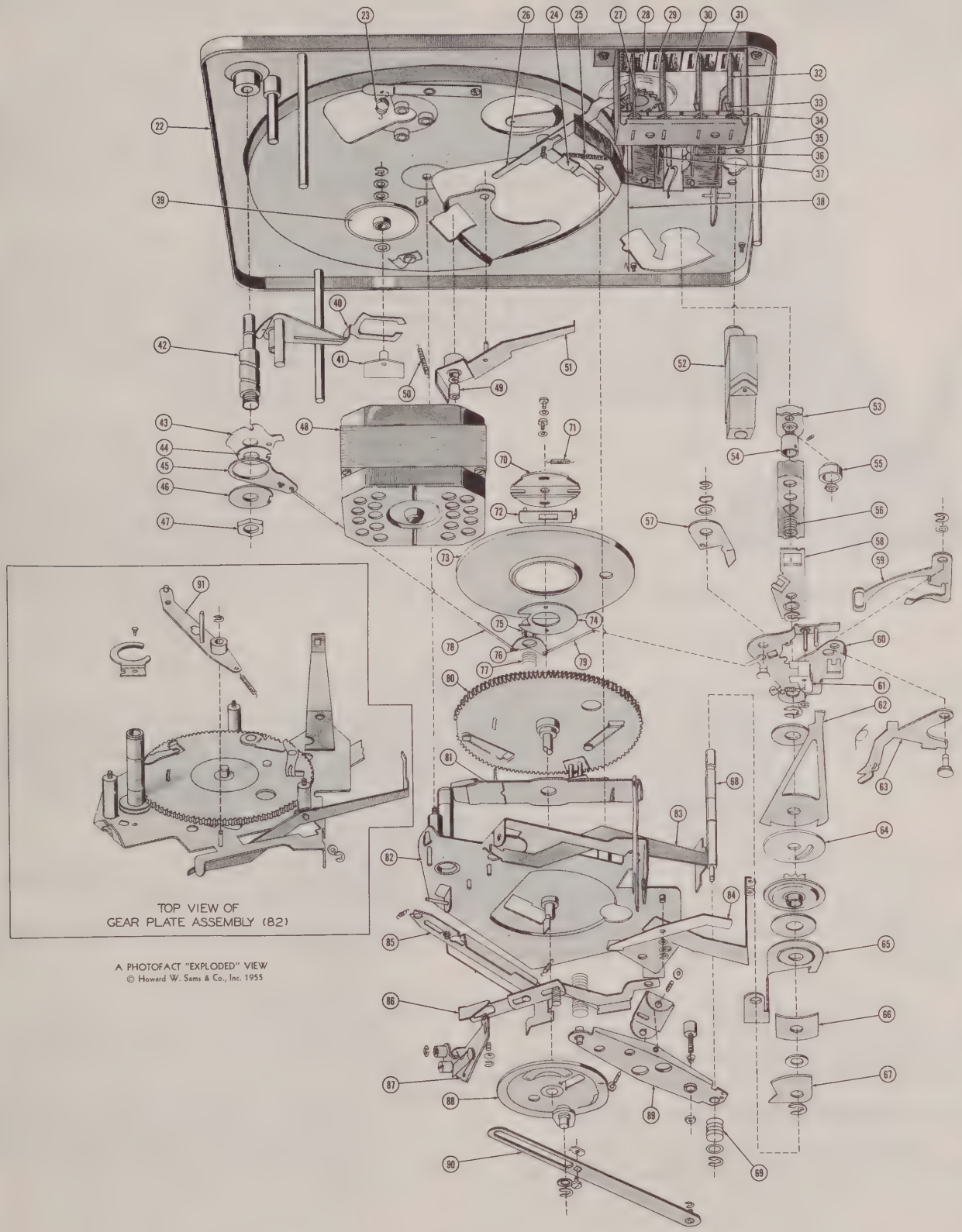


Figure 6B. Exploded View Of Parts Below Baseplate.

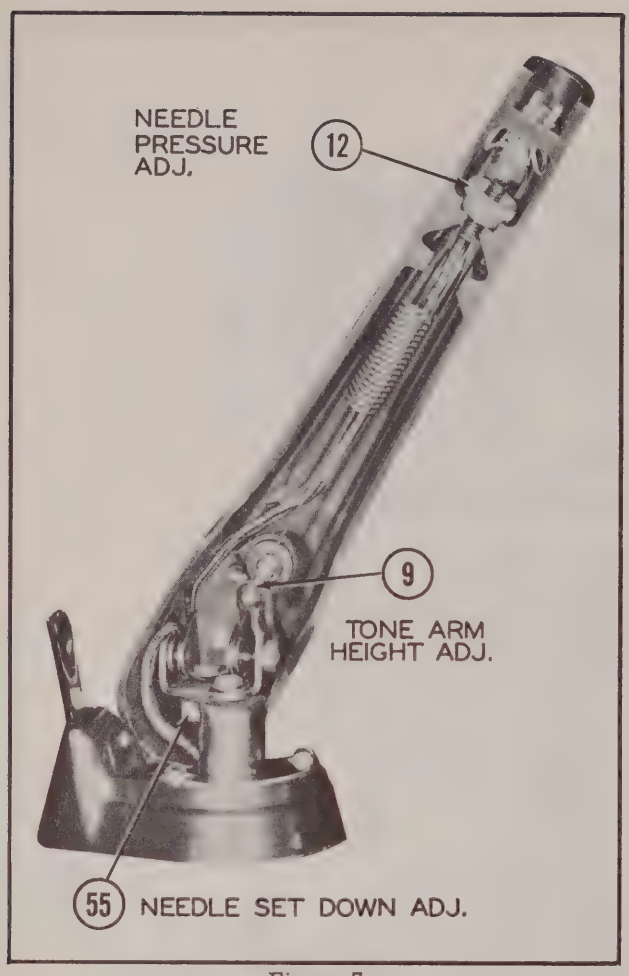


Figure 7

completes its revolution the nose on its outer surface strikes and pushes repeat bar (86) into its normal position. The changer will now continue to change each record in sequence until the "Repeat" button is again depressed.

ADJUSTMENTS

Needle Pressure Adjustment-(Refer To Figure 7)-

The needle pressure depends upon the data for the cartridge used. It is to be measured on the level of the first record at the needle and, in consideration of the mechanism of the changer, must not be less than 6.5 grams.

The needle pressure can be regulated by turning knurled nut (12). Turning nut (12) clockwise will decrease the pressure and turning counterclockwise will increase the needle pressure.

Tone Arm Height Adjustment-(Refer To Figure 7)-

The height to which the tone arm will raise, during change cycle, is adjusted by knurled screw (9). To adjust, cycle changer by hand until the tone arm has moved in over the turntable and while the arm is at maximum height turn screw (9) until the needle point lies 1" above the rubber turntable mat. After this adjustment is made, check to see if the tone arm lands low enough to play a thin record. If not, lower height slightly.

Needle Set-Down Adjustment-(Refer to Figure 7)-

The tone arm landing point can only be adjusted for all sizes of records in common. It suffices to adjust the landing point for one size record by turning the tone arm accordingly in relation to its support. This is done by turning knurled eccentric screw (55).

Tone Arm Brake Adjustment-(Refer To Figure 3)-

When the tone arm is in playing position, a small gap should be seen between brake segment (67) and brake adjustment screw (89A), to allow the tone arm to move freely across a record. The gap is adjusted by turning brake adjustment screw (89A).

Idler Wheel (39) Height Adjustment-

Place speed control knob (17) in the "o" position and lift off the turntable. Check to see that idler wheel (39) lies horizontal and that its height is correct. The bottom edge of the idler wheel tire must not be sliding on the next step of the motor pulley. The height can be adjusted by loosening hex. nut (47) and turning speed change worm (42). Then tighten hex. nut (47) well and, if necessary, set knob (17) so that its numerals face the triangular mark on the baseplate.

LUBRICATION

Additional lubrication should not be required for a long period of time. If the changer is operated without interruption for long periods of time and the mechanism becomes noisy or if the levers and sliding members become sluggish to respond, lubricate as follows:

With S.A.E. #10 Motor Oil:

1. One drop at the pivot points of all levers which appear to be sluggish in operation.

2. Apply one drop on the top and bottom felt pads of the motor.

With Ball Bearing Grease:

1. Apply a thin coat on the sliding surfaces of sluggish sliding lever members.

CAUTION: Do not allow oil or grease to come in contact with the inside rim of the turntable, the step pulley on the motor, idler wheel tire (39), or pause drive ring (49). Clean these surfaces with a petroleum solvent.

L. F. B. A. KENSHIP
3924 MEADE ST.
DENVER, COLORADO

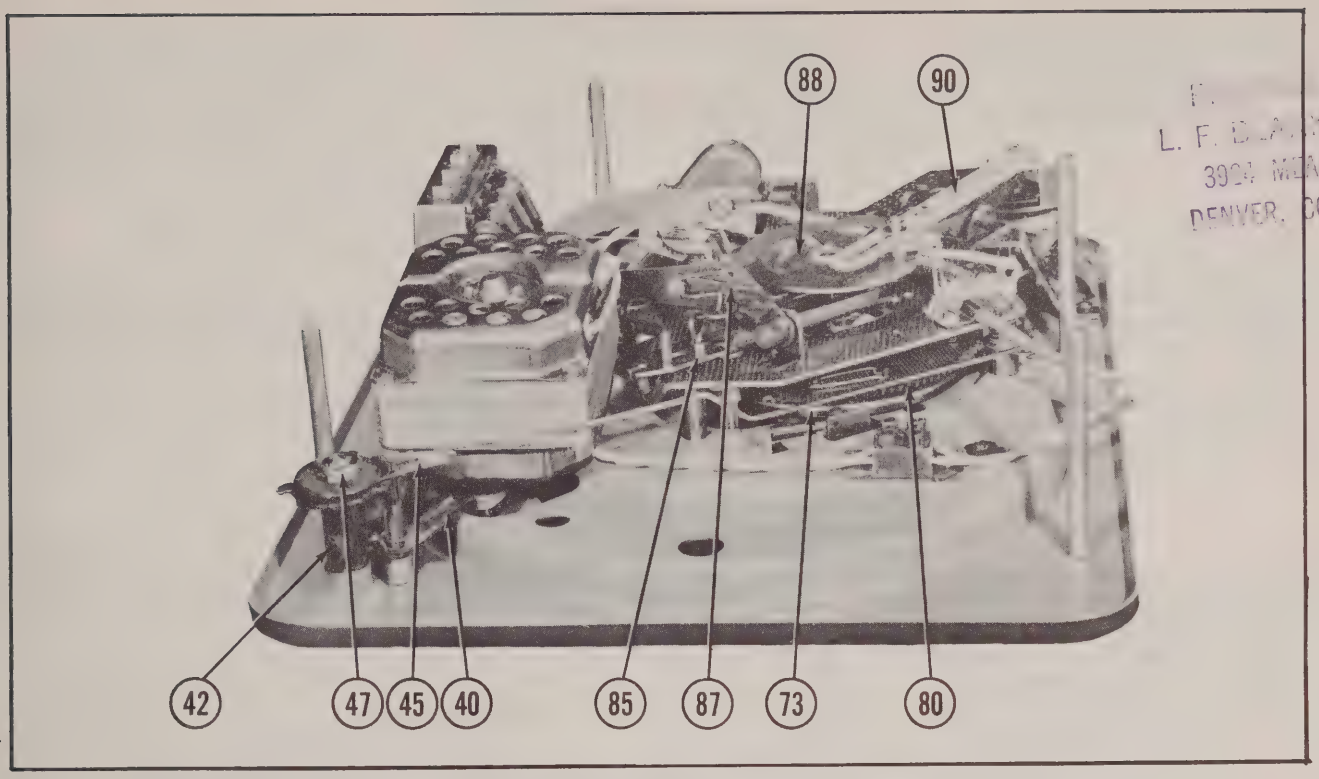


Figure 8

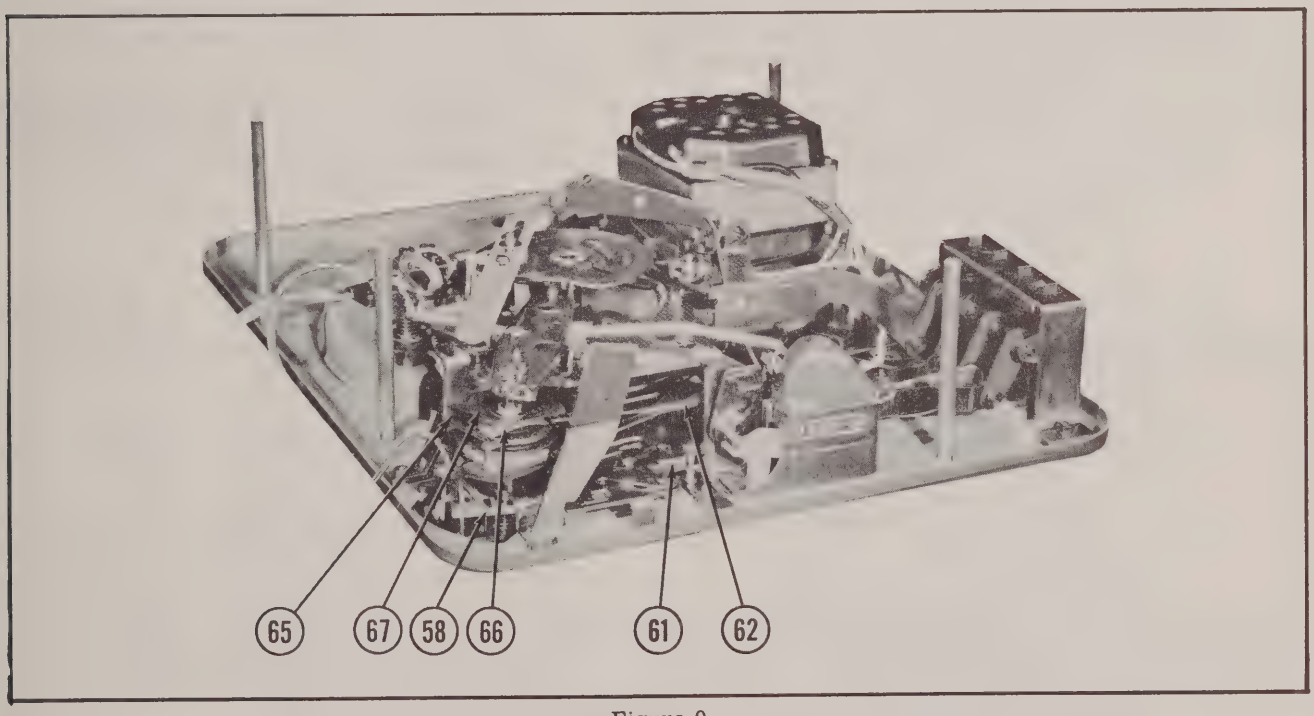


Figure 9

TROUBLE SHOOTING CHART

SYMPTOM	CAUSE	REMEDY
Tone arm lands in wrong place.	1. Controlling elements not free to move.	Check cut-out in wooden mounting base and position of drilled holes with the aid of a template. Lay connecting wires so that they do not come into contact with drive elements.
	2. Dislocated during transport.	See "Tone Arm Set-Down Adjustment".
Changer does not trip when needle reaches end of record.	1. Weighted segment (62) cannot overcome force of recoil lever (20).	Remove turntable and recoil lever (20). Lubricate recoil lever bearing with light oil, (1 drop).
Changer trips before tone arm reaches end of record.	1. Center hole in record too large.	Discard faulty record.
	2. Felt washer (64) dirty, causes weighted segment (62) to bind.	Clean felt washer.
Tone arm lands in 10" position when playing 7" records or lands in 7" position when playing 10" records.	1. Rod connecting lever (76) hangs up on mounting base.	Check cut-out in base and make wider, if necessary.
	2. Rod (78 or 79) bent.	Bend rods so that 7" stop dog (57) is in proper position when 7" records are played.
Tone arm lands in 10" position when playing 12" records.	1. 12" stop dog (63) binding on stop dog plate (60).	Clean 12" stop dog (63) or, if necessary, replace.
Record does not stop.	1. Record spindle stroke too small.	Adjust screw on rear of spindle actuating lever (85) to lengthen spindle stroke.
	2. Record spindle jamming.	Replace spindle.
	3. Repeat bar (86) jamming.	Clean foreign matter from bar (86) and oil pivot points.
Reproduction poor.	1. Records slipping, warped.	Discard records.
	2. Pick-up cartridge or stylus defective.	Replace cartridge or stylus.
	3. Turntable binding.	Remove turntable, clean hub and shaft, lubricate inside of turntable hub with light machine oil. Keep the outside surface of the turntable hub free from oil.
Rumbling noise when turntable revolves.	1. Idler wheel tire (39) dirty or dented.	Remove turntable and clean idler wheel tire, motor pulley, and inside of turntable rim with a petroleum solvent.
Changer does not shut off after last record has been played.	1. Wire on bottom of record spindle does not actuate levers (83) and (87).	Adjust eccentric screw on end of shut-off lever (87) so that wire on bottom of record spindle actuates levers (83) and (87).
	2. Protruding wire at bottom of record spindle broken.	Replace record spindle.
	3. Line switch (52) defective.	Replace line switch.
Changer shuts off before all records have dropped from record spindle.	1. Eccentric screw on end of shut-off lever (87) improperly adjusted.	Adjust eccentric screw on end of shut-off lever (87) so that levers (83) and (87) are actuated, by wire on bottom of record spindle, only when the last record of a stack drops from the turntable.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

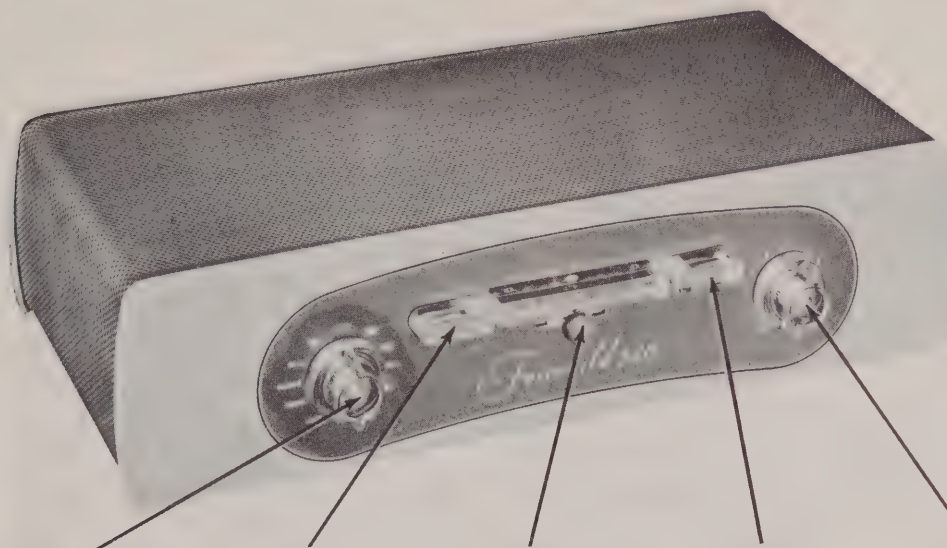
TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
Turntable does not revolve when "Start" button is depressed.	1. No current at motor.	Check that current is reaching A.C. leads of changer.
	2. Line switch (52) defective.	Replace line switch.
	3. Motor defective.	Remove the turntable and allow motor to operate without load. If current is reaching motor and motor shaft does not rotate, the motor is defective. Repair or replace.
		Check all wiring and soldered terminals in the changer.

PARTS LIST

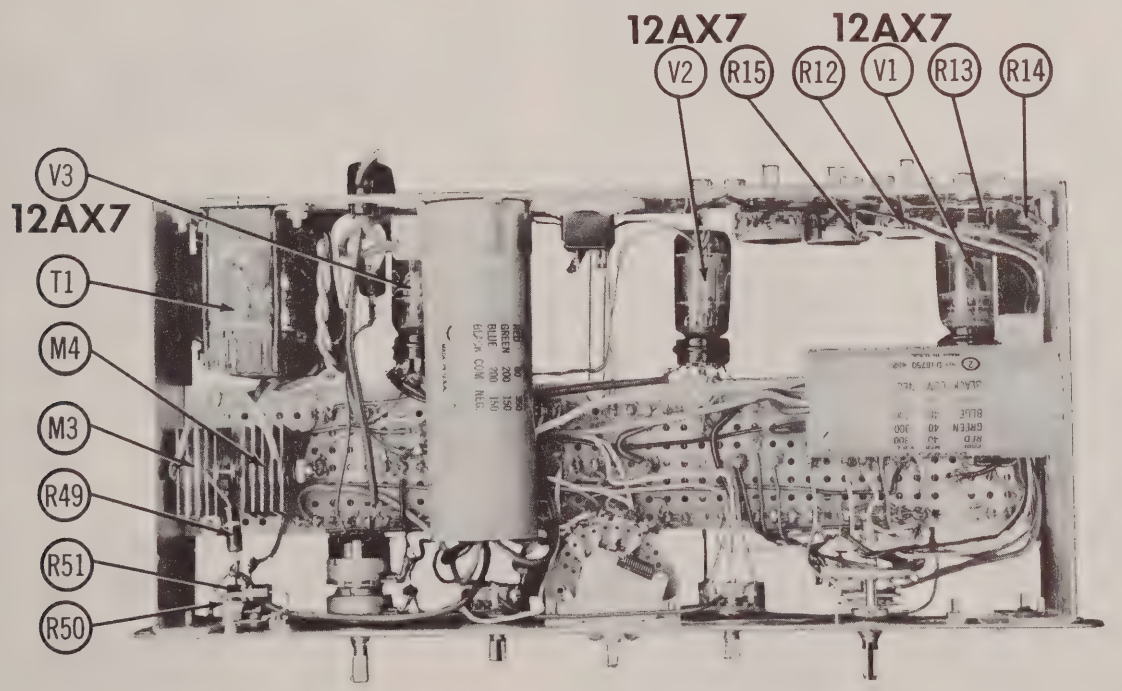
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	10-024B	Record Spindle	47		Hex. Nut
2	10-028	Single Play Spindle	48	10-036-A	Motor
	10-033	45 R. P. M. Record Adaptor	49	10-027-40	Pause Drive Ring
	10-025C	45 R. P. M. Record Spindle	50	10-012-40	Tension Spring
3	10-027-100	Rubber Turntable Mat	51	10-038U5	Pause Drive Axle Lever
4	10-038U50	Turntable, Complete	52	10-038U11	Line Switch, Complete
5	10-038U12	Wire Holder for Pick-up Arm	53	10-038U7	Tone Arm Support
6	10-102A	Pick-up Arm	54	10-038-55	Setting Ring
7	10-101A	Plug-in Head	55	10-038-23	Knurled Set-Down Adj. Nut
8	10-038-78	Tone Arm Mtg. Bracket Bridge	56	1-02301-144	Compression Spring
9	10-027-189	Tone Arm Height Adj. Screw	57	10-027-211	7" Slide Lever
10	10-038U8	Tone Arm Mtg. Bracket	58	10-027U47	Tracer Lever
11	10-038-26	Needle Pressure Spring	59	10-027-207	Repeat Lever
12	10-038-29	Needle Pressure Adj. Nut	60	10-027U44	Stop Dog Plate, Complete
13	10-038-28	Headless Screw	61	10-027-213	Ratchet Lever
14	10-027U18	Scanning Lever, Complete with Housing	62	10-027U22	Weighted Segment
			63	10-027-210	12" Stop Dog
15	10-027-82	Helical Twist Spring	64	10-016-14	Felt Washer
16	10-027-84	Leveling Piece	65	10-027-92	Tone Arm Actuating Lever
17	10-027-21	Speed Control Knob	66	10-027-93	Spring Washer
18	10-027U6	Rubber Cogwheel	67	10-027-72	Brake Segment
19	90-068A	Voltage Selector	68	10-038-16	Tone Arm Support Rod
20		Recoil Lever Assembly	69	10-025-22	Compression Spring
21	10-038-51	Motor Mtg. Grommet	70	10-027-141	Guide Disk
22	10-038U1	Baseplate, Complete	71	10-038-72	Slide Piece Tension Spring
23	10-016-36	Idler Wheel Tension Spring	72	10-027U33	Slide Piece
24	10-038U4	Pause Lever	73	10-027-135	Interval Disk
25	10-038-73	Tension Spring	74	10-027-125	Triazetatfolie
26		Pause Actuating Lever	75	10-027-221	Spacer
27	10-027U3	Ratchet Wheel & Scale	76	10-027-220	Rod Connecting Lever
28	10-027U8	Repeat Button	77	10-027-236	Compression Spring
29	10-027U9	Pause Button	78	10-027-223	Rod
30	10-027U10	Filter Button	79	10-027U57	7" Set-Down Rod
31	10-027U11	Start Button	80	*	Cogwheel
32		Push Button Shaft	81	*	Cycle Starting Catch
33		Start Actuating Link	82	*	Gear Plate
34		Push Button Return Spring	83	10-027-265	Switch-Off Lever
35		Start Link	84	10-038-14	Start Lever
36		Filter Actuating Link	85	10-027U35	Spindle Actuating Lever
37		Pause Actuating Link	86	10-027U38	Repeat Bar, Complete
38		Pause Rod	87	10-027U64	Shut-Off Lever
39	10-016U8	Idler Wheel, Complete	88	*	Cam Disk
40	10-038U3	Idler Pivot Lever	89	10-027U39	Tone Arm Control Lever
41		Idler Wheel Mtg. Plate	90	10-027U41	Tone Arm Coupling Rod
42	10-027-20	Speed Change Worm	91	10-038-10	Pause Gap Actuating Lever
43	10-027-23	Speed Change Cam			* Not Individually Replaceable. Must Be Replaced With The Complete Gear Plate Assembly Part #10-038U13.
44	10-027-237	Washer			
45	10-027-220	7" Set Down Actuating Lever			
46	10-027-22	Notched Plate			

PROPERTY OF
L. [illegible] SHIP
[illegible] ST.
DENVER, COLORADO



TRADE NAME	Fairchild Model 240
MANUFACTURER	Fairchild Recording Equipment Co., 154th & Powell's Cave Blvd., Whitestone 57, N. Y.
TYPE SET	AC Operated 4 Channel Audio Preamplifier & Equalizer
TUBES (Three)	Types 12AT7 Phono Preamp., 12AX7 AF Amp., 12AX7 AF Amp. -Cathode Follower
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.17 Amp. @ 117 Volts AC

FAIRCHILD
MODEL 240



HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

FAIRCHILD
Model 240

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Fairchild PART No.	STANDARD REPLACEMENT		
V1	Phono Pre-Amp.	12AT7	12AT7	9A	
V2	AF Amp.	12AX7	12AX7	9A	
V3	AF Amp. - Cathode Follower	12AX7	12AX7	9A	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Fairchild PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	80	350					
B	200	150					
C	200	150					
C2A	40	300		FP420.38		Q-012	
B	40	300					
C	40	300					
D	40	300					

FIXED CAPACITORS

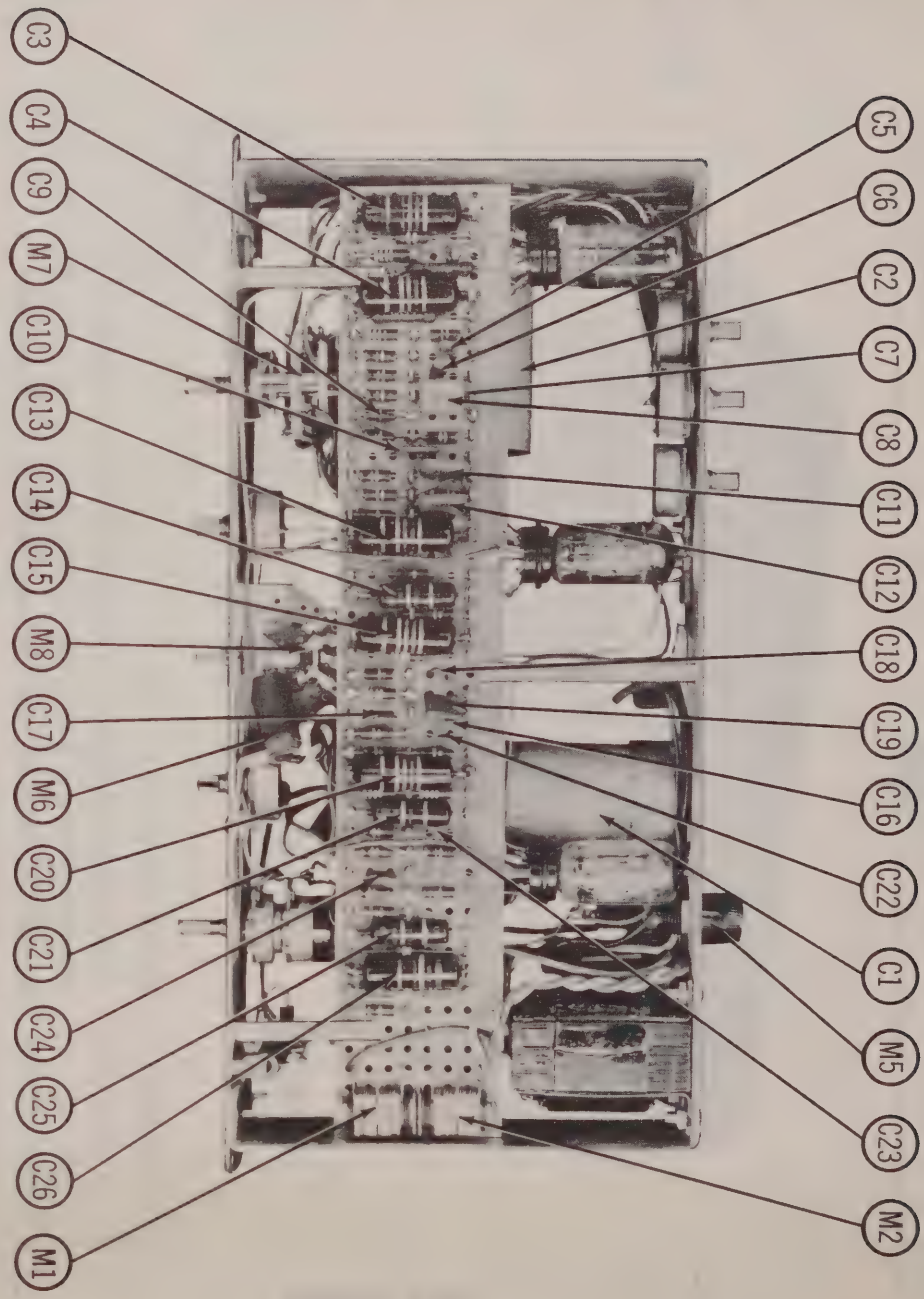
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	Fairchild PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C3	.047	400		DF-503		PT4147	
C4	.047	400		DF-503		PT4147	
C5	1000				811-102		
C6	650			D6-681	811-681		
C7	430			TCN-430	N750-334-431		
C8	20000			DF-203	817-02	PT-412	
C9	5			DD-050	831-050	ZT-555	
C10	20000						
C11	20000						
C12	6800						
C13	.047	400		DF-503		PT4147	
C14	.01	400		D6-103	GP3-333-103	PT411	
C15	.047	400		DF-503		PT4147	
C16	330			DD-331	811-331		
C17	1500				811-152		
C18	470			D6-471	811-471		
C19	5000						
C20	.047	400		DF-503		PT4147	
C21	.01	400		D6-103	GP3-333-103	PT411	
C22	500			D6-501	811-501		
C23	470			D6-471	811-471		
C24	3300						
C25	.01	400		D6-103	GP3-333-103	PT411	
C26	.1	200		DF-104		PT401	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Fairchild PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	250KΩ	½	D21663-5	Q13-130			UF254A	Volume (Panel)
B	1Meg	½	Not Req.	M13-137			UR16A	Attach to R1A (Rear)
C	Shaft		Not Req.	Not Req.			DS-36	Attach to R1B.
D	Switch		Not Req.	76-1			US-26	Attach to R1B.
R2	2.5Meg	½	D21663-3					Treble
R3	2.5Meg	½	D21663-4					Bass
R4A	50KΩ	½	D21663-1	Q13-123	A47-50K-Z	AB-32	U33	Auxiliary Input
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A.
R5A	50KΩ	½	D21663-1	Q13-123	A47-50K-Z	AB-32	U33	Radio Input
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A.
R6A	20KΩ	½	D21663-2	Q13-120		AB-24	U24	Tape Output
B	Shaft		Not Req.	Not Req.		AK-4	Not Req.	Attach to R6A.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Fairchild PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R7	47KΩ	½		BTS-47K	
R8	1800Ω	½		BTS-1800	
R9	560KΩ	½		BTS-560K	
R10	220KΩ	½		BTS-220K	
R11	33KΩ	½		BTS-33K	
R12	470KΩ	½		BTS-470K	
R13	470KΩ	½		BTS-470K	
R14	33KΩ	½		BTS-33K	
R15	470KΩ	½		BTS-470K	
R16	1500Ω	½		BTS-1500	
R17	220KΩ	½		BTS-220K	
R18	22KΩ	½		BTS-22K	
R19	1Meg	½		BTS-1Meg	
R20	1Meg	½		BTS-1Meg	
R21	15KΩ	½		BTS-15K	
R22	82KΩ	½		BTS-82K	
R23	220KΩ	½		BTS-220K	
R24	10Meg	½		BTS-10Meg	
R25	10Meg	½		BTS-10Meg	
R26	10Meg	½		BTS-10Meg	
R27	10Meg	½		BTS-10Meg	
R28	10Meg	½		BTS-10Meg	
R29	820KΩ	½		BTS-820K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Fairchild PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R30	1200Ω	½		BTS-1200	
R31	220KΩ	½		BTS-220K	
R32	330KΩ	½		BTS-330K	
R33	1Meg	½		BTS-1Meg	
R34	47KΩ	½		BTS-47K	
R35	1200Ω	½		BTS-1200	
R36	150KΩ5%	½		BTS-150K 5%	
R37	22KΩ 5%	½		BTS-22K 5%	
R38	330KΩ	½		BTS-330K	
R39	47KΩ	½		BTS-47K	
R40	220KΩ	½		BTS-220K	
R41	1Meg	½		BTS-1Meg	
R42	100KΩ	½		BTS-100K	
R43	100KΩ	½		BTS-100K	
R44	560KΩ	½		BTS-560K	
R45	2700Ω	½		BTS-2700	
R46	100KΩ	½		BTS-100K	
R47	10KΩ	½		BTS-10K	
R48	47Ω	½		BTS-47	
R49	10Ω	1			
R50	225Ω	10		1 3/4A-225	
R51	100KΩ	1		BTA-100K	
R52	220Ω	½		BTS-220	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA Fairchild PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .17A	400VCT .0035ADC	135VCT .135A		B21674					

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA Fairchild PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.0018A					16Y1		
M2	.0018A					16Y1		
M3	.071A		1004A		6S150	5P1	150	
M4	.071A		1004A		6S150	5P1	150	

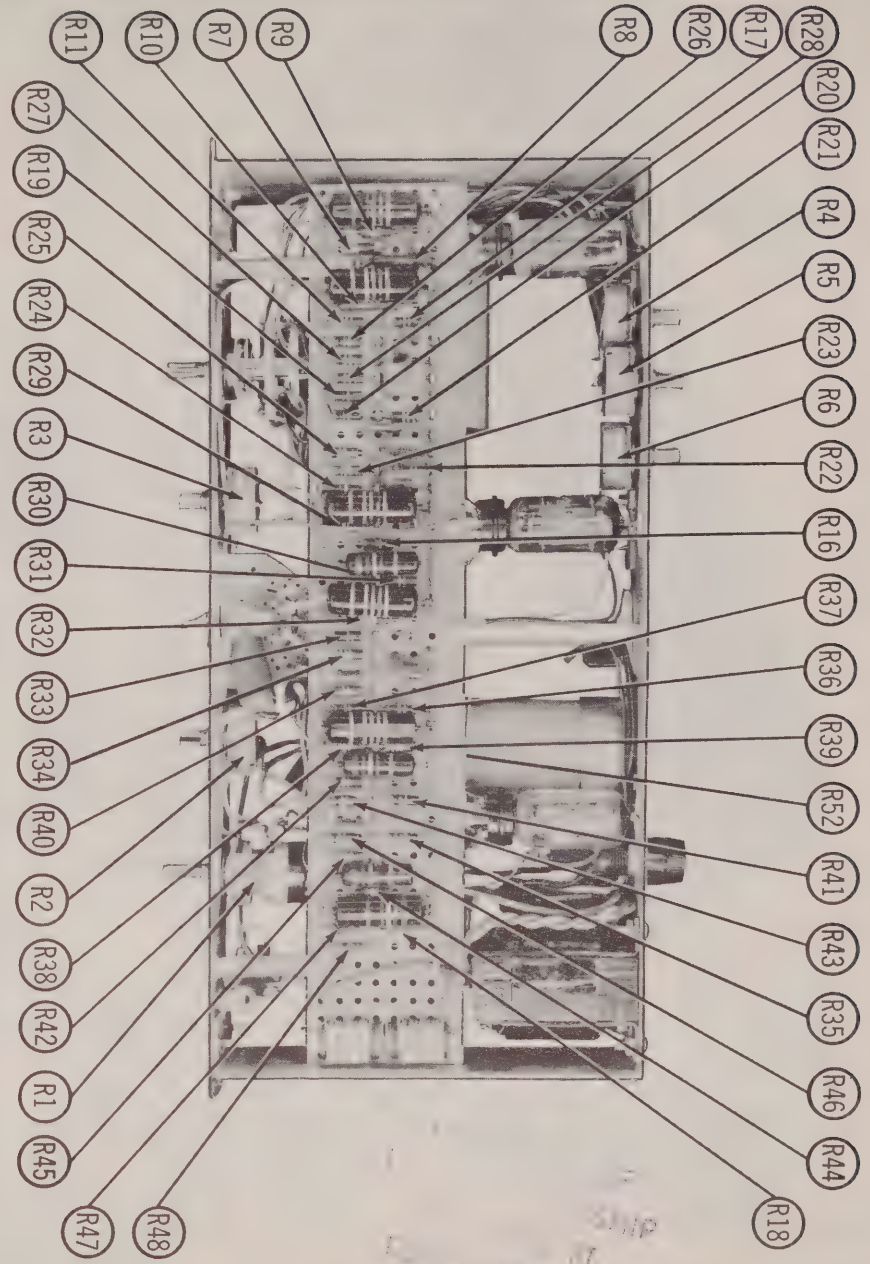
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA Fairchild PART No. FUSE	Fairchild PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M5	8AG	½A 250V			362.500 (8AG ½A)	372001	AGX½	HJM

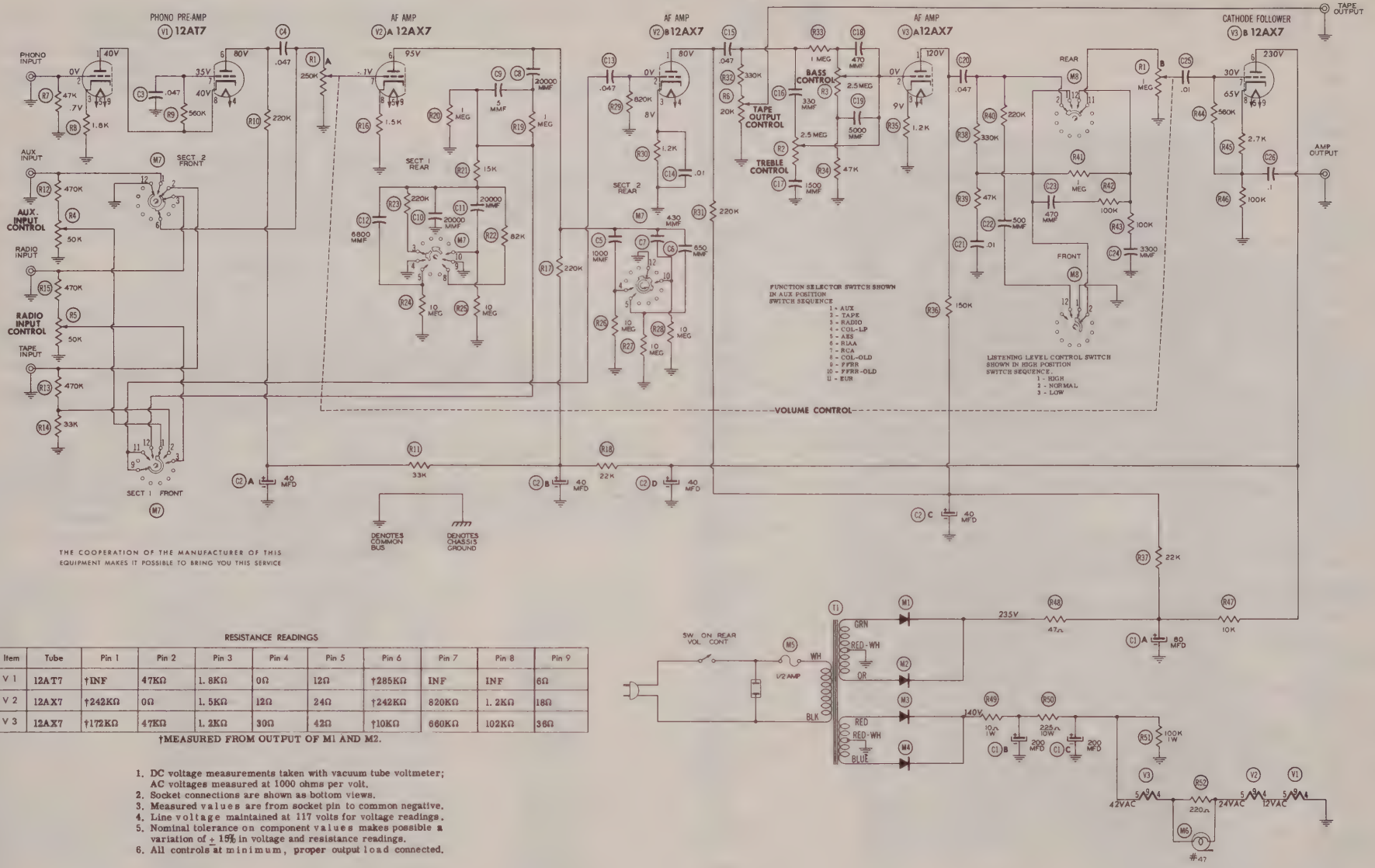
MISCELLANEOUS

ITEM No.	PART NAME	Fairchild PART No.	NOTES
M6	Pilot Light		#47
M7	Switch	D21685	Selector & Record Compensation (Rotary-Wafer Type)
M8	Switch	A21680	Listening Level (2P-3Position)

CHASSIS—TOP VIEW



FAIRCHILD Model 240



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

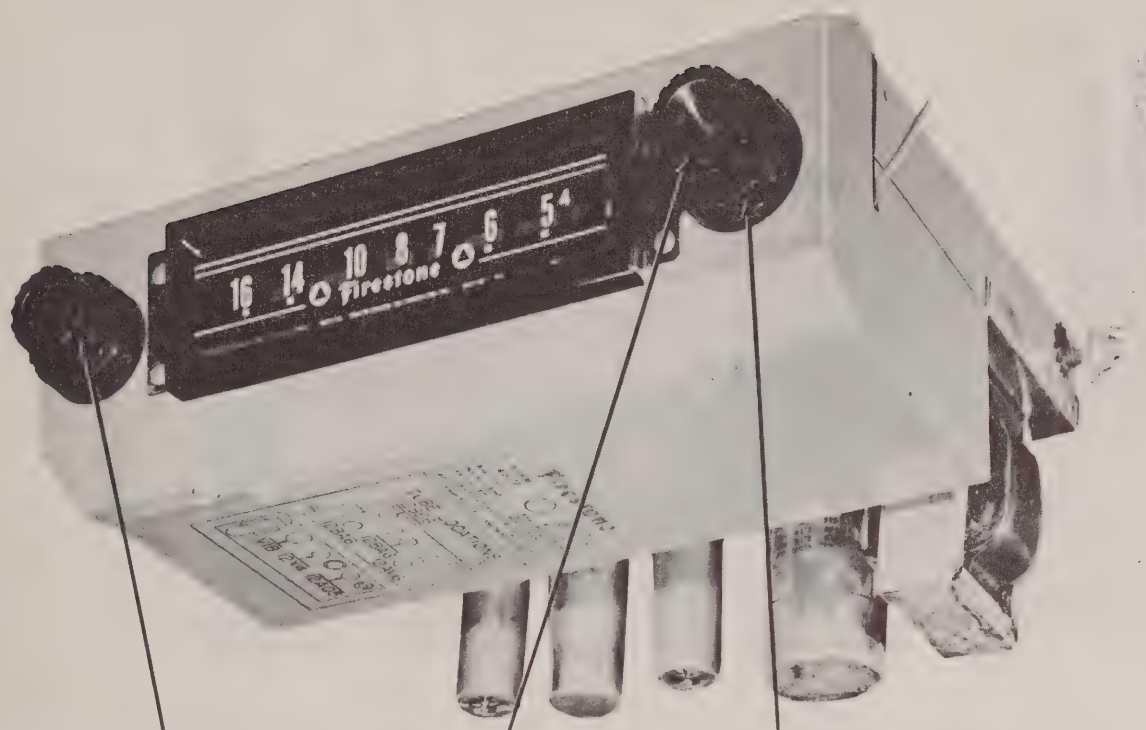
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AT7	†INF	47KΩ	1. 8KΩ	0Ω	12Ω	†285KΩ	INF	INF	6Ω
V 2	12AX7	†242KΩ	0Ω	1. 5KΩ	12Ω	24Ω	†242KΩ	820KΩ	1. 2KΩ	18Ω
V 3	12AX7	†172KΩ	47KΩ	1. 2KΩ	30Ω	42Ω	†10KΩ	660KΩ	102KΩ	36Ω

†MEASURED FROM OUTPUT OF M1 AND M2.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

FIRESTONE MODEL
4-B-77 (Code 120-5-C325)



394 [illegible] ST.
DENVER, COLORADO

FIRESTONE MODEL
4-B-77 (Code 120-5-C325)

TRADE NAME	Firestone Model 4-B-77 (Code 120-5-C325) (For 1955 Chevrolet Automobiles)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron, Ohio
TYPE SET	Battery Operated Custom-Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det. -AVC-AF Amp., 12AQ5 Output, 12X4 Rectifier
POWER SUPPLY	12 Volt Storage Battery — RATING 2.8 Amp. @ 12.6 Volts
TUNING RANGE—BROADCAST	538KC-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	455KC (400~ Mod.)	Tuning Gang fully open.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1610KC	"	"	A5	"
3.	68MFD	Thru dummy to ant. receptacle. Low side to chassis.	1400KC	Tune to 1400KC signal.	"	A6, A7	Adjust for maximum output. With receiver installed & antenna fully extended and tuned to weak signal adjust A7 for maximum volume.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det. -AVC-AF Amp	12AV6	12AV6	7BT	
V5	Output	12AQ5	12AQ5	7BZ	
V6	Rect.	12X4	12X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	FIRESTONE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■20	350	CE-86	FP330	TM-3029	T-470	
B	▲20	350					
C	20	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

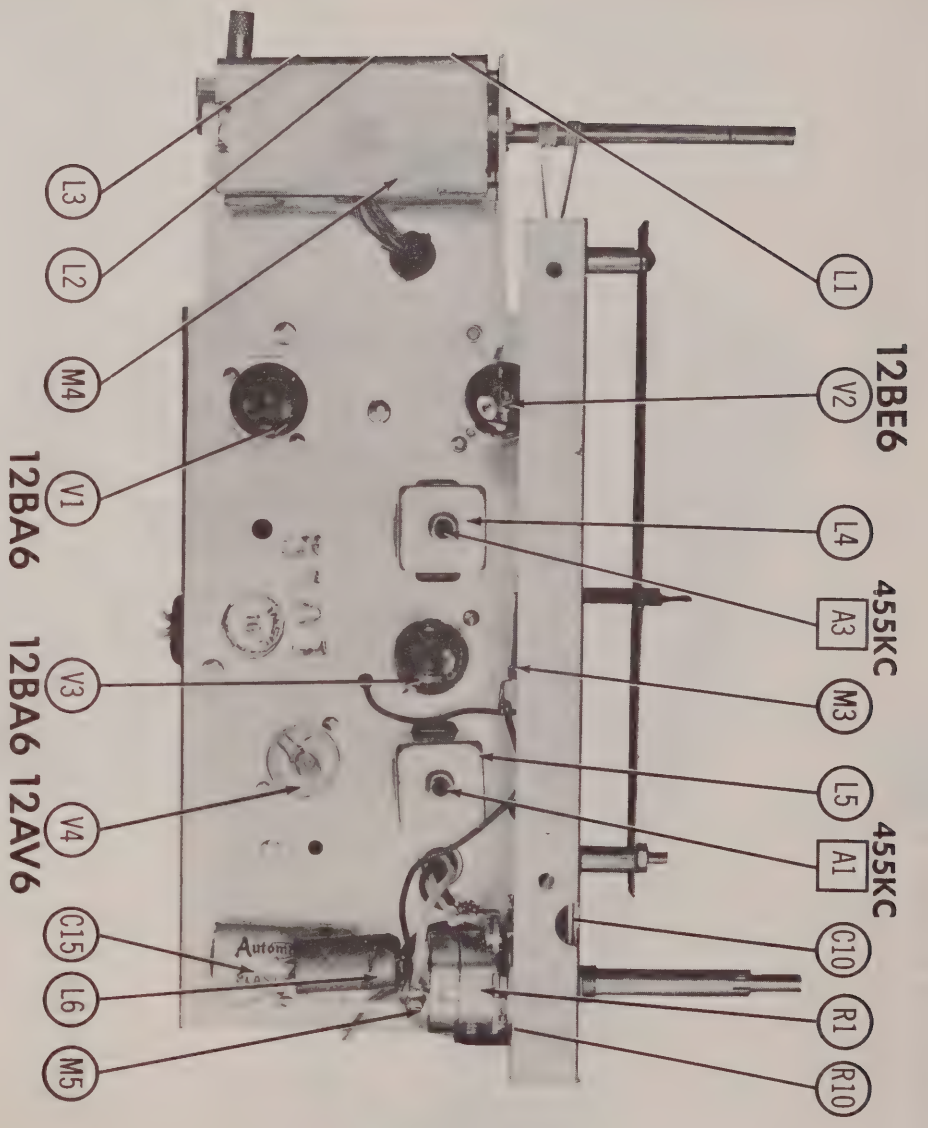
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	100		CC101	TCZ-100	NPO-337-101	ZT-531	
C3	5000			D6-502	GP2-333-502	UC-525	Note 2
C4	.068	200				PT616	Note 3
C5	5			TCZ-4R7	NPOA-050	ZT-555	
C6	40						
C7	.05	200		DF-503		PT415	
C8A	220						
B	5000						
C	5000		♦PC-151	♦PC-151	♦1408-02		
D	250						
E							
C9	4700						Note 4
C10	15000			D16-153	821-015	PT6115	Note 1
C11	.01	600		D6-103	GP3-333-103	PT611	
C12	.005	1600		D16-502		PT1625	
C13	.47	100				RF480	
C14	.47	100				RF480	
C15	.5	100				RF480	

Note 1. Some versions may use a .01MFD unit (Part No. CC103) in this application.
Note 2. Some versions may use a .006MFD unit (Part No. C602-4) in this application.
Note 3. Some versions may use a .05MFD unit (Part No. C503-2) in this application.
Note 4. Some versions may use a .002MFD unit (Part No. CC202) in this application.
♦ Items C8A, C8B, C8C, C8D, C8E, R9A, R9B, and R9C are combined in one unit. When replacing items separately, C8D and C8E should total 250MFD.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	RV-666			F1-71	UF26A	Tone (Panel)
B	500KΩ	½				R2-48	UR55-T154	Volume (Rear) Tap at 130KΩ
C	Switch					KB-4	US-26	Attach to R1B

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FIRESTONE PART No.	IRC PART No.	
R2	470KΩ	½	R474	BTS-470K	
R3	300Ω	½		BTS-270	Note 1
R4	150KΩ	½	R154	BTS-150K	
R5	47KΩ	½	R473	BTS-47K	
R6	6800Ω	2	R682-2	BTB-6800	
R7	1000Ω	½	R102	BTS-1000	
R8	2.2Meg	½	R225	BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FIRESTONE PART No.	IRC PART No.	
R9A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦PC-151	BTS-470K	
C	470KΩ	½		BTS-470K	
R10	22KΩ	½	R223	BTS-22K	
R11	330Ω	½	R331	BTS-330	
R12	1000Ω	1	R102-1	BTA-1000	
R13	10KΩ	½	R103	BTS-10K	
R14	270Ω	1	R271-1	BTA-270	
R15	270Ω	1	R271-1	BTA-270	

Note 1. Some versions use a 220Ω ½W resistor in this application, Mfgr. Part No. R221.
♦ Items C8A, C8B, C8C, C8D, C8E, R9A, R9B, R9C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	12.6VCT @1.5A	440VCT .048ADC			TV-555D		P-2860			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5.2KΩ	3.5Ω	T0-4502	Z1107	A-2930	A-3877	24S51	S-3X	

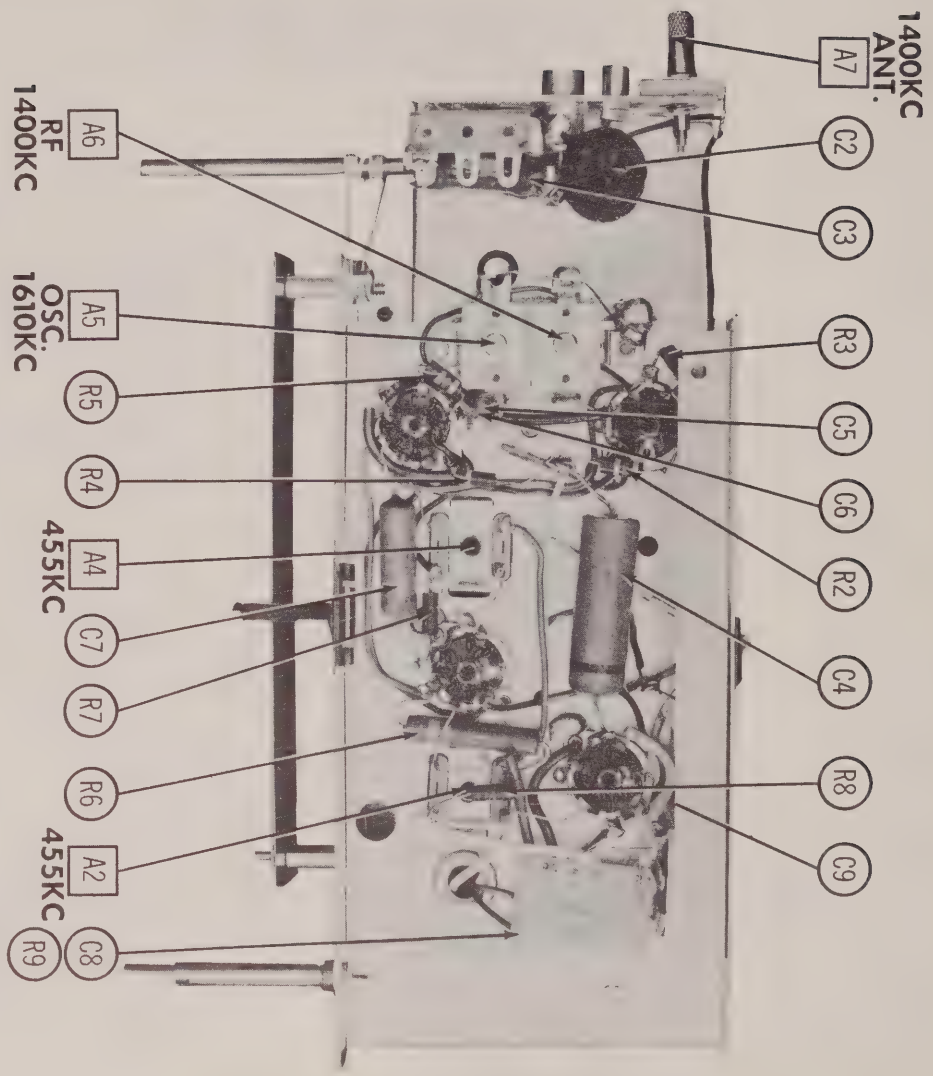
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	FIRESTONE PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3.5Ω	PM-901	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	12Ω						Part of tuner assy.
L2	RF Coil	12Ω						Part of tuner assy.
L3	Osc. Coil	.4Ω	2.4Ω					Part of tuner assy.
L4	Input IF	13Ω	13Ω	1655-6	16-6758	BC-352	12-C1	
L5	Output IF	13Ω	13Ω	1655-6	16-6758	BC-353	12-C2	
L6	Fil. Choke	0Ω		L203	19-4215	BC-537	5221	
L7	Vib. Hash Choke	0Ω		L202				

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

VIBRATOR

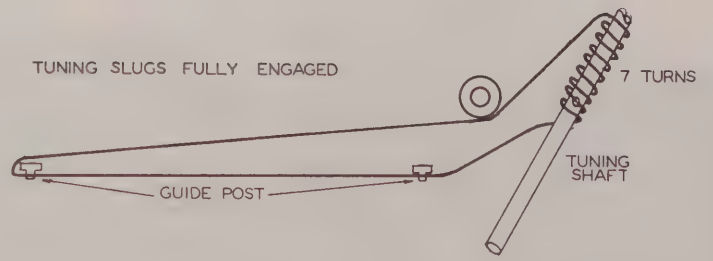
ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				FIRESTONE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	12. 6V	115v	V-55	6330	G874/G883	6330	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FIRESTONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	7AG	7½A	A100	AC-320	30307. 5 (7AG 7½A)		AGW7½	

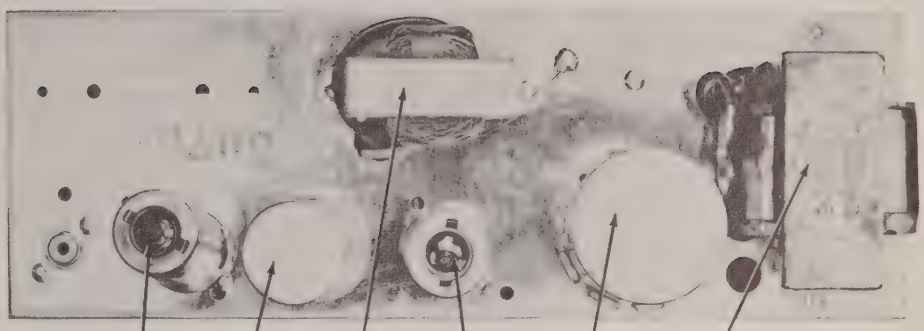
MISCELLANEOUS

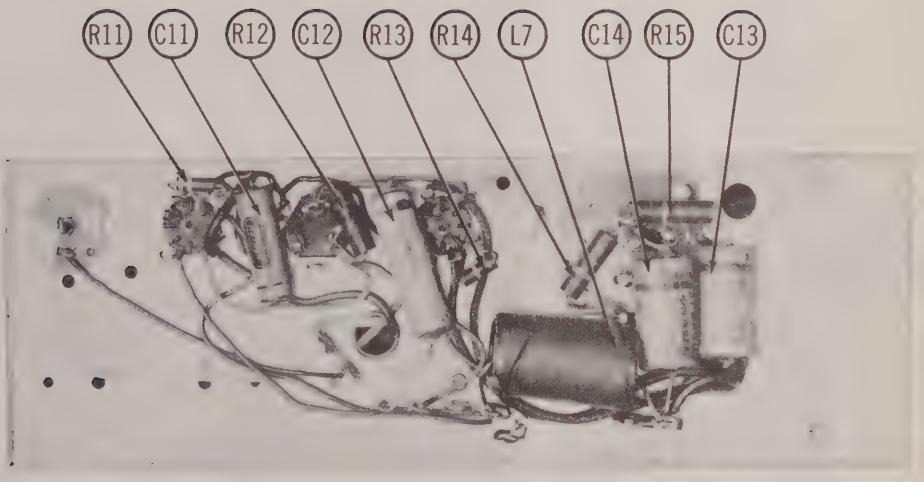
ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M3	Dial Light	W1815	#1815
M4	Tuner	PT325DC	Permeability, Includes L1, L2, L3
M5	Spark Plate	X21S	
A5	Trimmer Cap.	CT-3	Osc. Trimmer
A6	Trimmer Cap.	CT-2	RF Trimmer
A7	Trimmer Cap.	CT-1	Ant. Trimmer
	Knob	H907A	Tuning
	Knob	H710	On-Off-Volume
	Knob	H910	Tone
	Dial Scale	D325	
	Dial Pointer	PS325	

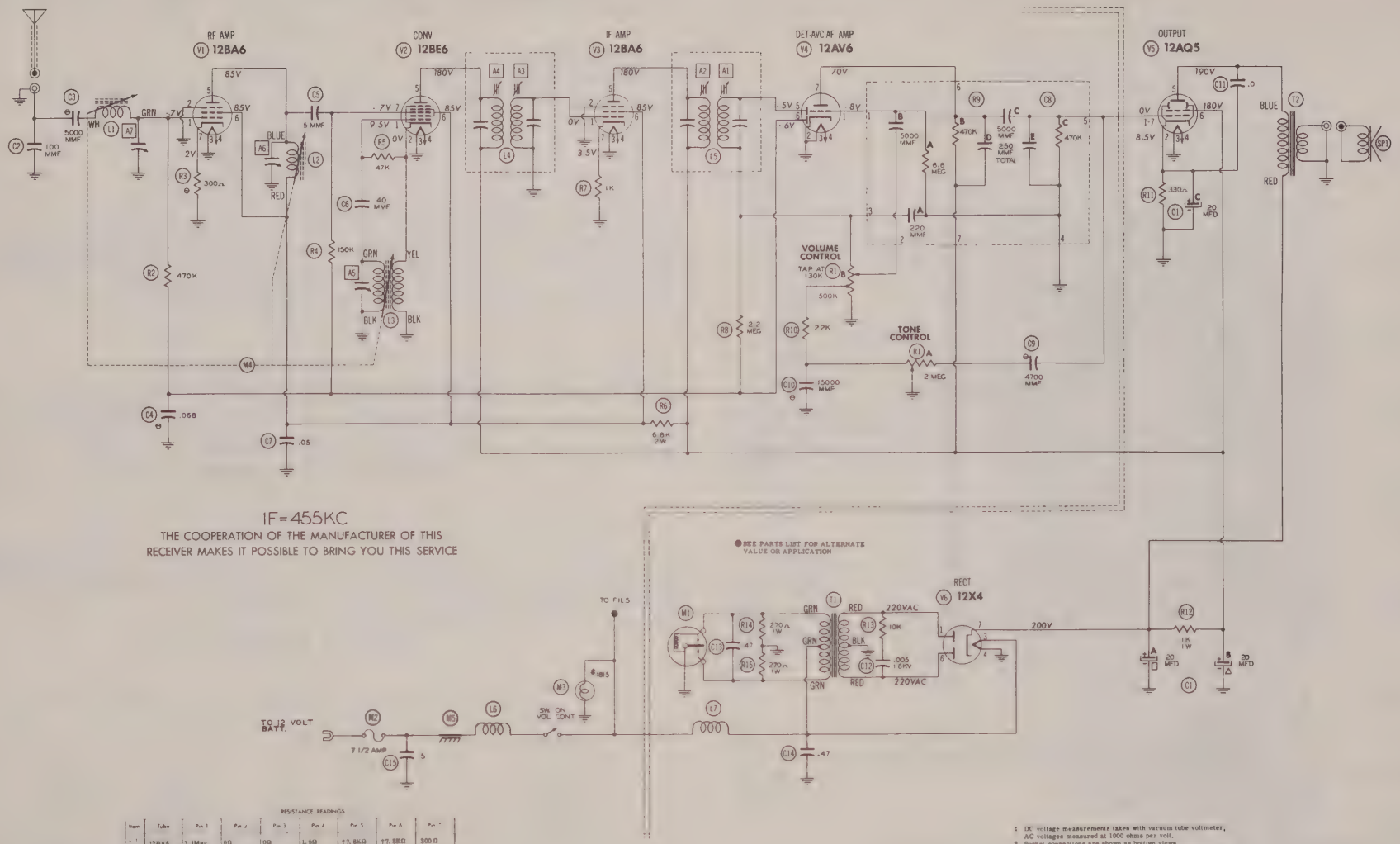


DIAL CORD STRINGING

L. F. [illegible]
3924 MEADE ST.
DENVER, COLORADO







RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BA6	3.1Meg	0Ω	0Ω	1.5Ω	↑7.8KΩ	↑7.8KΩ	300Ω
V2	12BE6	47KΩ	4Ω	0Ω	1.5Ω	↑1KΩ	↑7.8KΩ	2.8Meg
V3	12BA6	15Ω	0Ω	0Ω	1.5Ω	↑1KΩ	↑7.8KΩ	1KΩ
V4	12AV6	8.8Meg	0Ω	0Ω	1.5Ω	500KΩ	2.7Meg	1471KΩ
V5	12AQ5	470KΩ	330Ω	0Ω	1.5Ω	↑360Ω	↑1KΩ	470KΩ
V6	12X4	300Ω	TP	1.5Ω	0Ω	NC	300Ω	150KΩ

↑MEASURED FROM PIN 7 OF V6
NC-NO CONNECTION
TP-TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W Sams & Co Inc 1955

GENERAL ELECTRIC MODELS
645, 646, 647, 648

GENERAL ELECTRIC MODELS
645, 646, 647, 648

TRADE NAME	General Electric Models 645, 646, 647, 648
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, N.Y.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types: 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	105-120 Volts AC-DC (or) 1.5 volts "A" Supply & 75 Volts "B" Supply
RATINGS	.15 Amp. @ 117 Volts AC (or) 250MA @ 1.5 Volts DC & 8.5MA @ 75 Volts DC
TUNING RANGE—BROADCAST	540KC -1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum pos ition . Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a . .1MFD capacitor in series with low side of the signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	"	1620KC	"	"	A5	"
3.		Loop	1500KC	Tune to 1500KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

GENERAL ELECTRIC
Model 645

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		General Electric PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det.-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	General Electric PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■90	150	RCE-212				
B	▲40	150					
C	400	10					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	General Electric PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	200	RCC-086	DF-503		PT415	
C3	47		RCW-3192	D6-470	GP1K-470	UC-5447	
C4	10000		RCW-3054	DD-103	811-01	DC-511	
C5	3000		RCW-3118	DD-302	811-003	UC-523	
C6	2.7		RCW-3039				
C7	.33	100	RCN-070				
C8A	82		RCN-082	D6-820	GP1K-820		
B	2000			DD-202	801-002		
C	220			D6-221	GP2K-221		
D	5000			DD-502	811-005		
C9	5000		RCW-3014	DD-502	811-005	DC-525	
C10	2000		RCW-3119	DD-202	801-002	DC-522	
C11	.047	600	RCN-053	DF-503		PT6147	
C12	.05	400	RCN-036	DF-503		PT415	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	General Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	RRC-320	Q13-137	A47-1Meg-Z	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

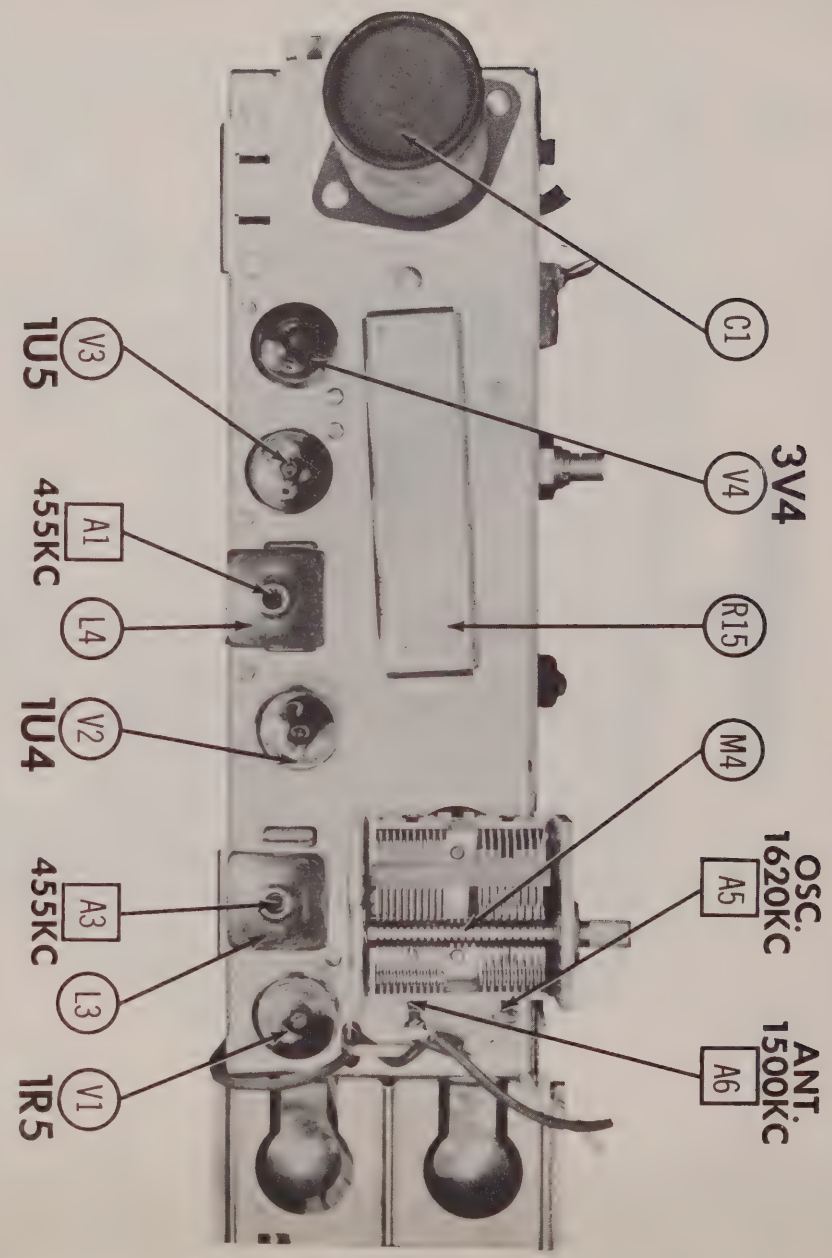
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	General Electric PART No.	IRC PART No.	
R2	100KΩ	½	URD-097	BTS-100K	
R3	15KΩ	½	URD-077	BTS-15K	
R4	3.3Meg	½	URD-133	BTS-3.3Meg	
R5	6.8Meg	½	URD-141	BTS-6.8Meg	
R6	3.3Meg	½	URD-133	BTS-3.3Meg	
R7	10Meg	½	URD-145	BTS-10Meg	
R8	4.7Meg	½	URD-137	BTS-4.7Meg	
R9	1Meg	½	URD-121	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	General Electric PART No.	IRC PART No.	
R10	3.3Meg	½	URD-133	BTS-3.3Meg	
R11	33KΩ	½	URD-085	BTS-33K	
R12	1000Ω	½	URD-049	BTS-1000	
R13	470Ω	½	URD-041	BTS-470	
R14	150Ω	½	URD-029	BTS-150	
R15	2700Ω	13	N-RRW-135		
R16	3300Ω	1	URE-061	BTA-3300	
R17	33Ω	4	N-RRW-134		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	General Electric PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9.2KΩ	3.7Ω	RTO-171		A-2927			S-11Z	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	General Electric PART No.	QUAM PART No.	
SP1	4"	PM	3.7Ω	ROP-031	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	General Electric PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.5Ω		RLL-061				
L2	Osc. Coil	1.9Ω	8Ω	RLC-134	14-1074	BC-387 *	70-OSC*	
L3	Input IF	37Ω	37Ω	RTL-152	16-6758	BC-352	12-C1	
L4	Output IF	40Ω	40Ω	RTL-152	16-6758	BC-353	12-C2	

* Drill mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	General Electric PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.064A	RER-020	1003A	RS075	6S75	6M4	75	

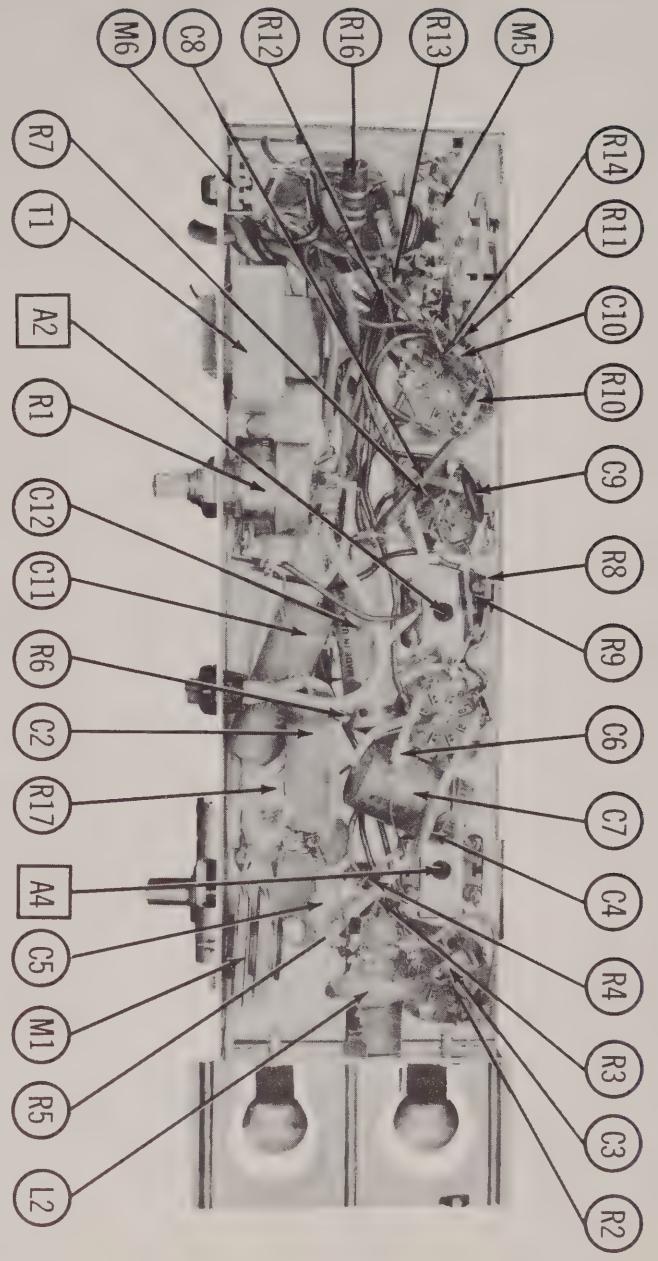
BATTERIES

ITEM No.	VOLTAGE	General Electric PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	1.5V"A"		964			2IR			Connect 2 in parallel
M3	75V"B"			437			XX50		

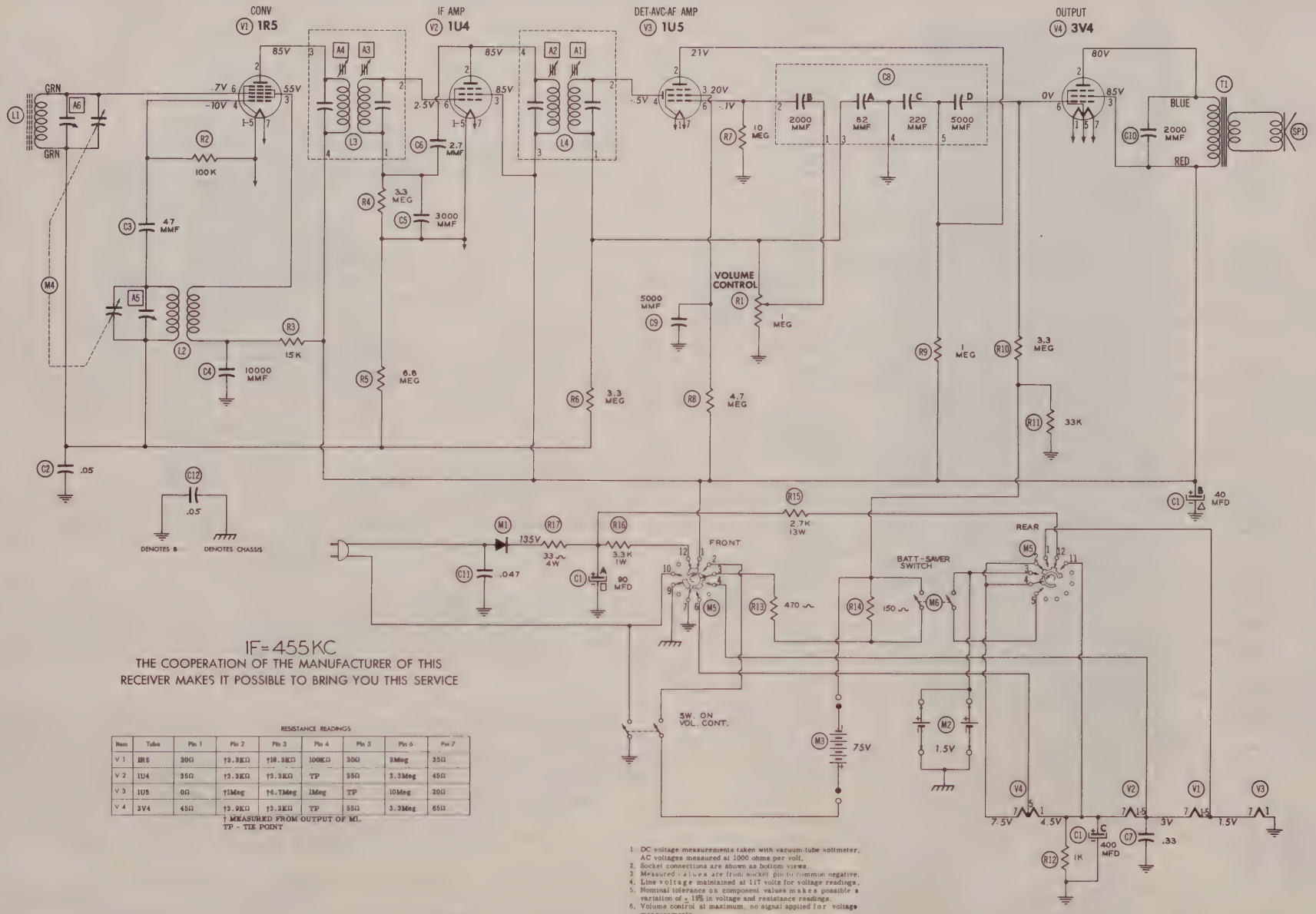
MISCELLANEOUS

ITEM No.	PART NAME	General Electric PART No.	NOTES
M4	Tuning Gang	RCT-084	2 Gang (21-300MMF, 16-120MMF)
M5	Switch	RSW-112	Power Change-over (Rotary-wafer type)
M6	Switch	RSS-008	Battery Saver (DPDT-Slide type)
	Cabinet	RAU-433	Model 646
	Cabinet	RAU-434	Model 647
	Cabinet	RAU-435	Model 648
	Cabinet	RAU-436	Model 645
	Knob	RDK-483	Tuning - Models 646, 647
	Knob	RDK-484	Tuning - Models 645,648
	Knob	RDK-485	On-off-volume - Model 646
	Knob	RDK-486	On-off-volume - Model 647
	Knob	RDK-487	On-off-volume - Model 645
	Knob	RDK-488	On-off-volume - Model 648
	Handle	RHY-068	Models 646, 647
	Handle	RHY-069	Models 645, 648
	Button	RDK-481	Battery saver switch - Models 646, 647
	Button	RDK-482	Battery saver switch - Models 645, 648

CHASSIS—BOTTOM VIEW



L. F. [illegible]
[illegible] ST.
DENVER, COLORADO



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	30Ω	†3.3KΩ	†10.3KΩ	100KΩ	30Ω	3Meg	35Ω
V 2	1U4	35Ω	†3.3KΩ	†3.3KΩ	TP	35Ω	3.3Meg	45Ω
V 3	1U5	0Ω	†1Meg	†4.7Meg	1Meg	TP	10Meg	20Ω
V 4	3V4	45Ω	†3.9KΩ	†3.3KΩ	TP	55Ω	3.3Meg	65Ω

† MEASURED FROM OUTPUT OF M1.
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

PHOTOFACT* Folder

*TRADE MARK

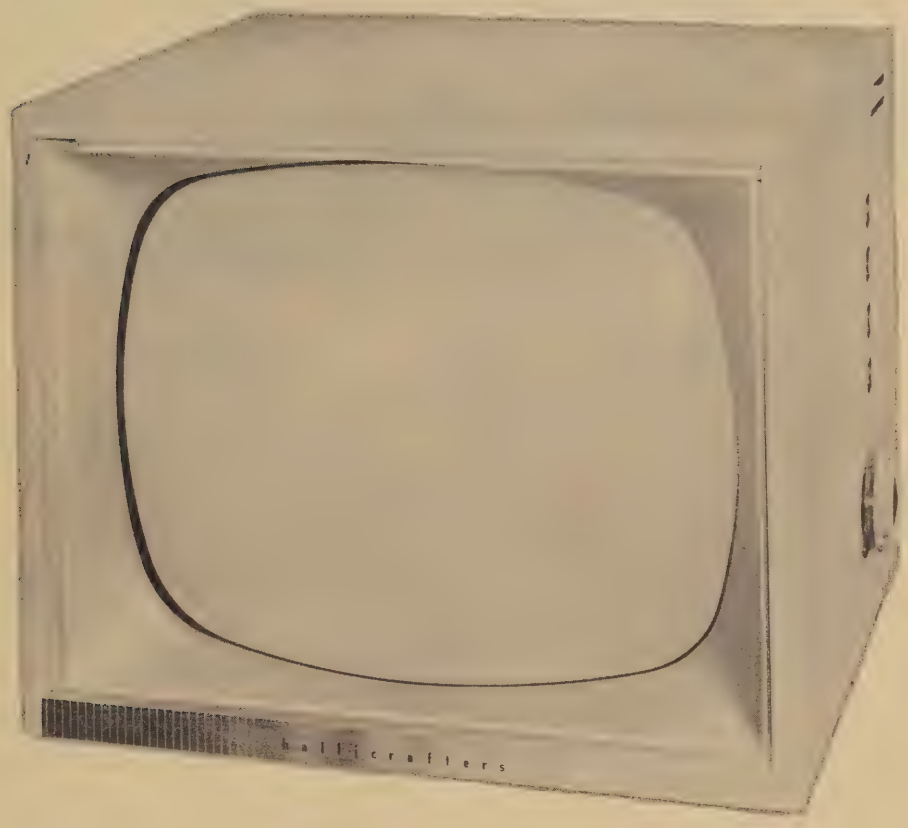
HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B160OD, E160OD)

PROPERTY OF
L. F[illegible]MENSHIP
[illegible]

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 21T320B

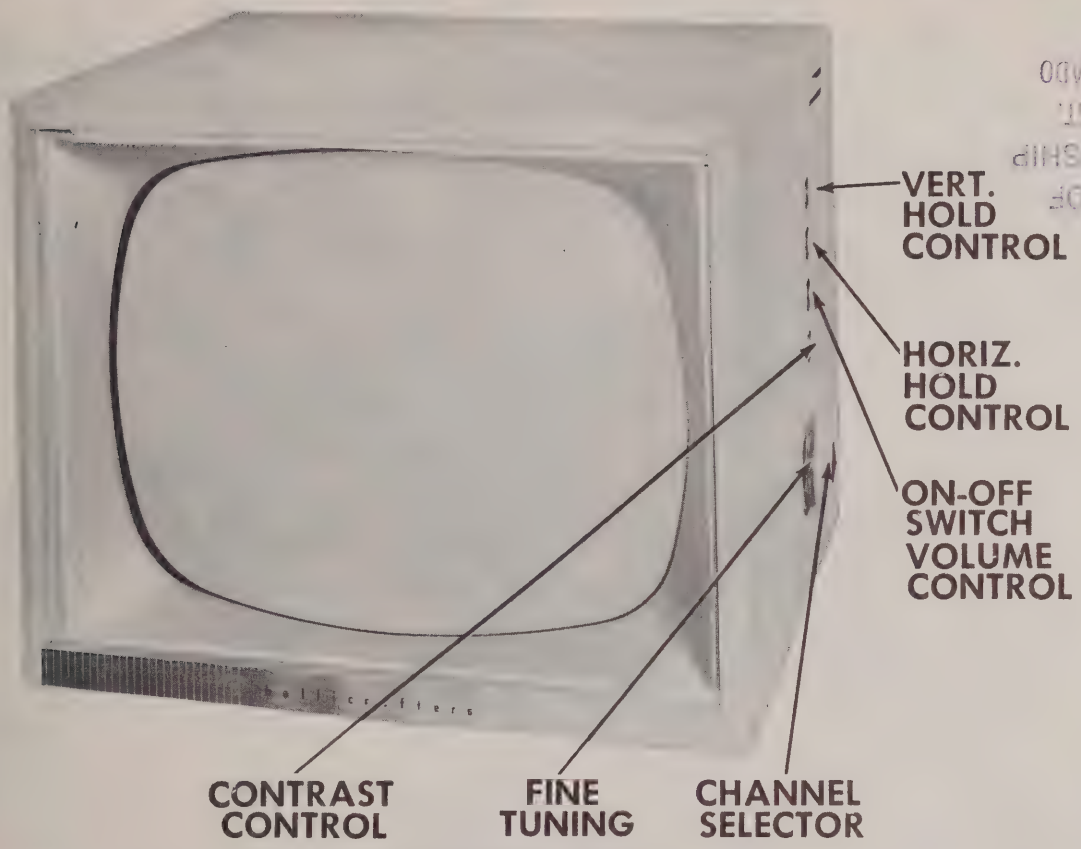
HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B160OD, E160OD)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 298 FOLDER 6

HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D)



PROPERTY OF
L. F. BLANKENSHIP
3521 MAPLE ST.
DENVER, COLORADO

HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D)

HALLICRAFTERS MODEL 21T320B

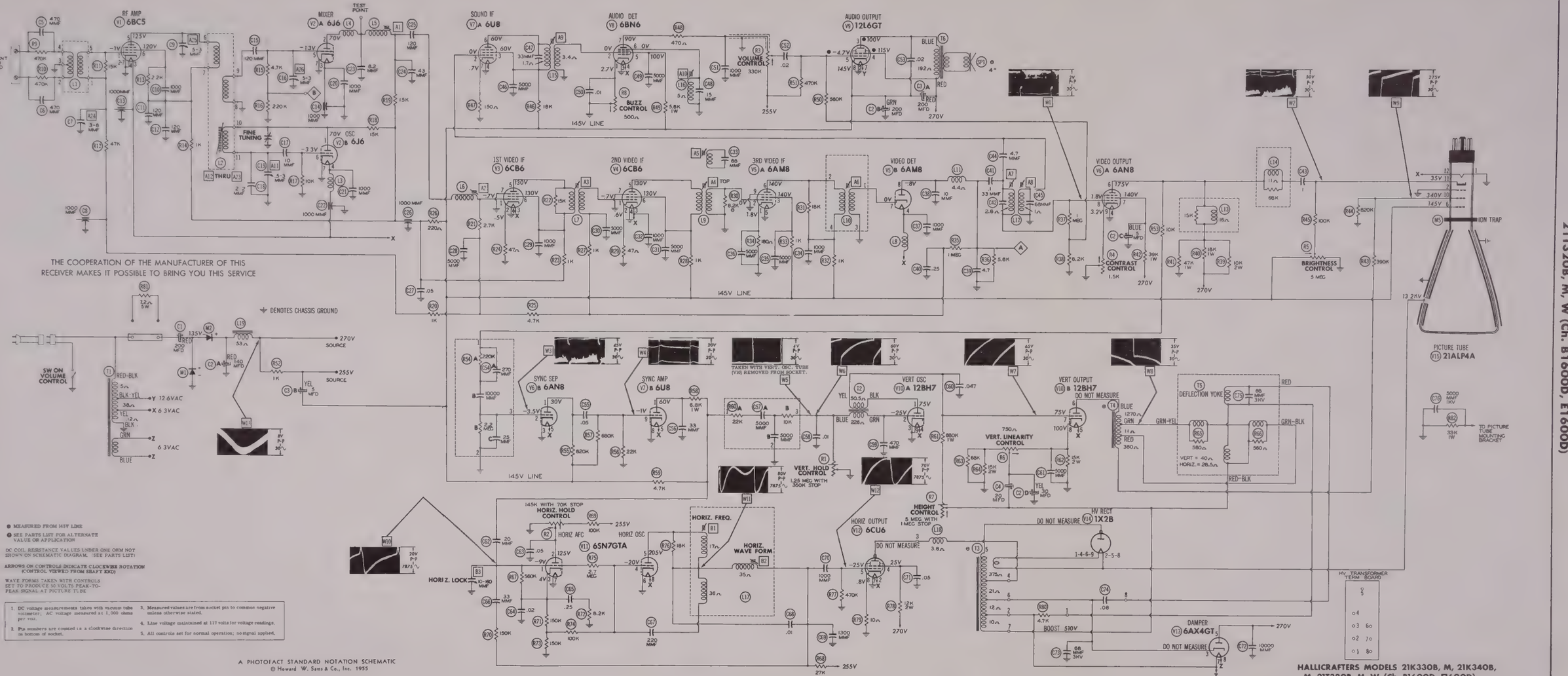
TRADE NAME	Hallicrafters	MODELS	CHASSIS
		21K330B, 21K330M, 21T320B, 21T320M, 21T320W	B1600D Runs 1, 2, 2A, 3, 3A
		21K340B, 21K340M	E1600D Runs 1, 1A, 2, 2A
MANUFACTURER	Hallicrafters Co., 4401 W. 5th. Ave., Chicago 24, Illinois		
TYPE SET	Television Receiver		
TUBES	Fifteen		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.26 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13, Video IF 26.4MC, Sound IF 21.9MC (Intercarrier)		

INDEX

Alignment Instructions 6, 7
Comparison of the 1600D Series Chassis 13
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Photographs (Cont)
Resistor Identification 19, 20
Trans., Inductor & Alignment Identification 17
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

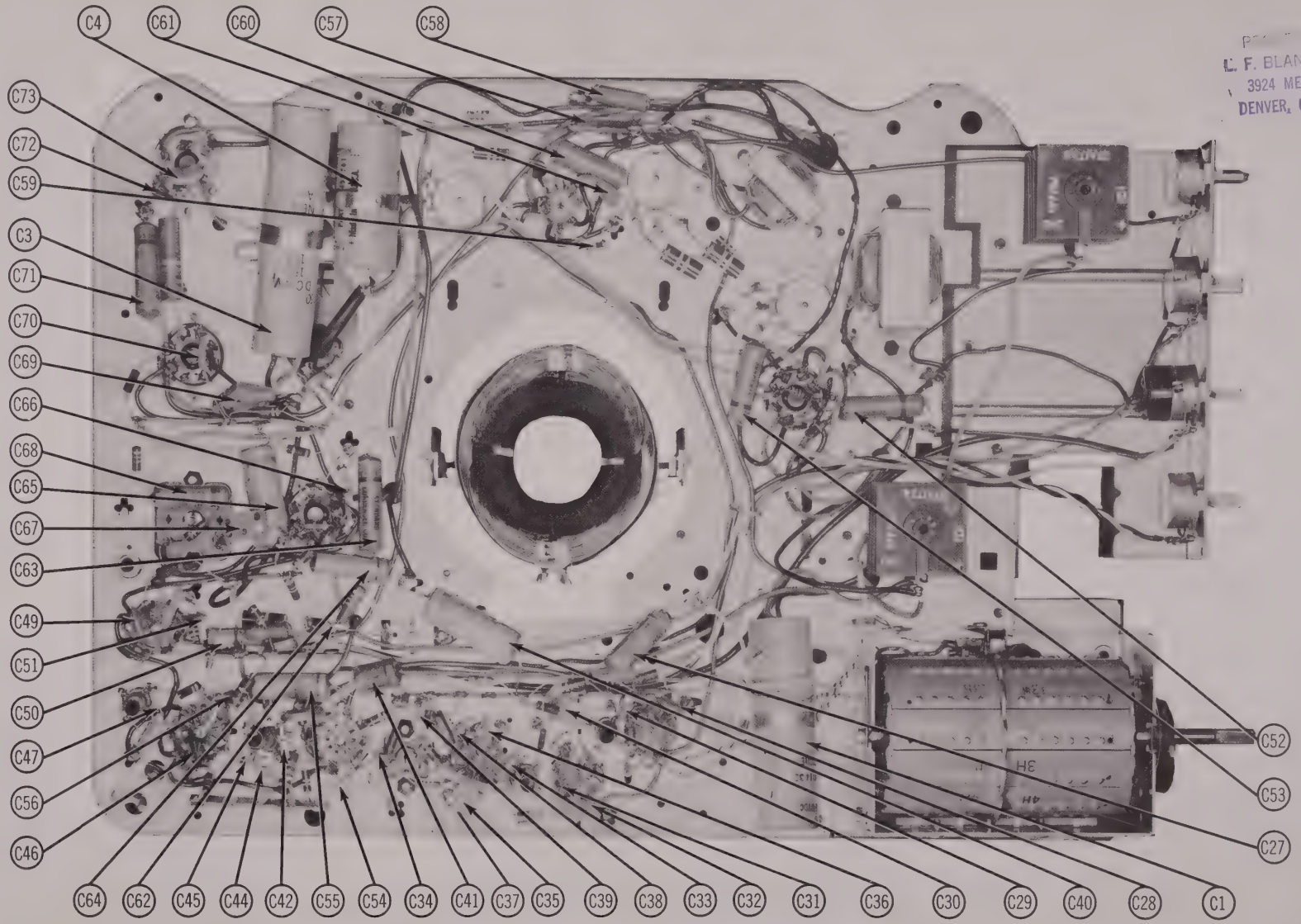

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
RF AMP V1 6BC5
MIXER V2A 6J6
TEST POINT
FINE TUNING
70V OSC V2B 6J6
SOUND IF V7A 6U8
AUDIO DET V8 6BN6
AUDIO OUTPUT V9 12L6GT
VOLUME CONTROL 330K
BUZZ CONTROL 500Ω
145V LINE
1ST VIDEO IF V3 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V5A 6AM8
VIDEO DET V5B 6AM8
VIDEO OUTPUT V6A 6AN8
CONTRAST CONTROL 1.5K
BRIGHTNESS CONTROL 5 MEG
ION TRAP
PICTURE TUBE V15 21ALP4A
TO PICTURE TUBE MOUNTING BRACKET
SYNC SEP V6B 6AN8
SYNC AMP V7B 6U8
TAKEN WITH VERT. OSC. TUBE (V10) REMOVED FROM SOCKET.
VERT OSC V10A 12BH7
VERT OUTPUT V10B 12BH7
DO NOT MEASURE
VERT. LINEARITY CONTROL
DEFLECTION YOKE
VERT = 40Ω
HORIZ. = 28.5Ω
VERT. HOLD CONTROL 1.25 MEG WITH 350K STOP
HORIZ. HOLD CONTROL
145K WITH 70K STOP
HORIZ AFC
HORIZ OSC
HORIZ. FREQ.
HORIZ. WAVE FORM
HORIZ. LOCK
HORIZ OUTPUT V12 6CU6
HEIGHT CONTROL 5 MEG WITH 1 MEG STOP
HV RECT V14 1X2B
1-4-6-9
2-5-8
BOOST 510V
DAMPER V13 6AX4GT
HV TRANSFORMER TERM BOARD
VHF ANT TERM BOARD
RED-BLK
BLUE
GRN-YEL
GRN-BLK
YEL
GRN
RED
BLK
BLUE-BLK
BLK-YEL
270V SOURCE
255V SOURCE
Y 12.6VAC
X 6.3VAC
Z 6.3VAC
Z
● MEASURED FROM 145V LINE
◎ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. (SEE PARTS LIST)
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D)

HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D)

CHASSIS TOP VIEW

HALLICRAFTERS MODELS 21K330B, M, 21K340B, M, 21T320B, M, W (Ch. B1600D, E1600D)

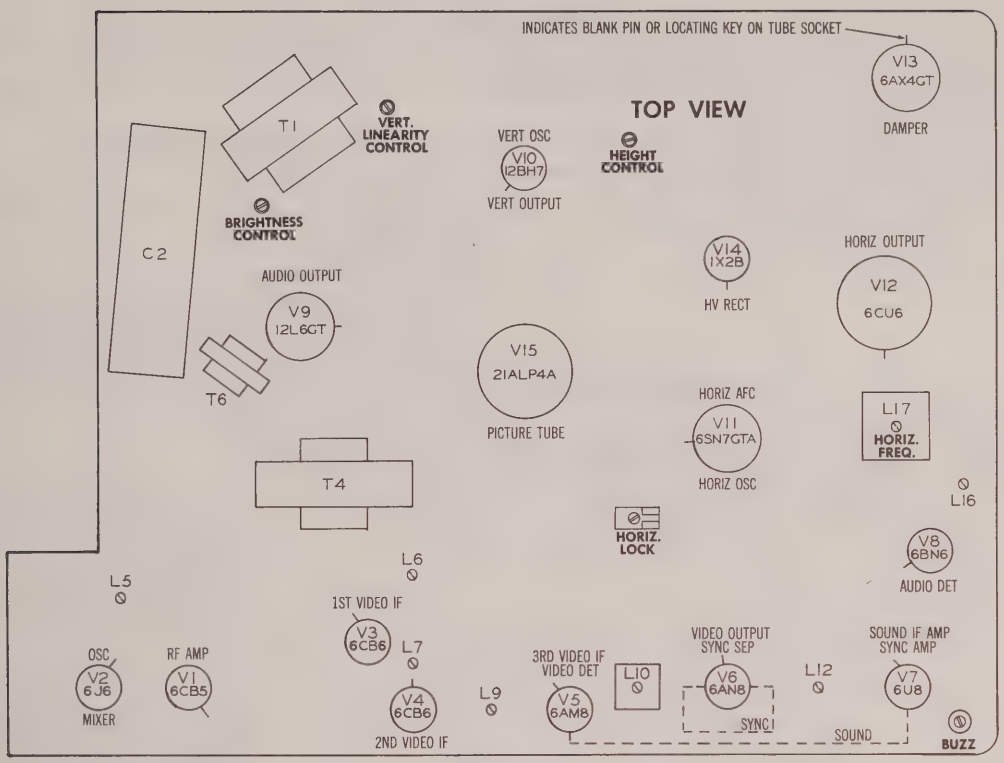
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
DENNIS BLANKENSHIP
3924 MEADE ST.

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V9**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V15**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V7, V10**
No horiz. sync - **V7, V11**
No vert. or horiz. sync - **V6, V7**

SWEEP FAILURE
No raster, has sound - **V11, V12, V13, V14, V15**
No vertical deflection - **V10**
Poor vert. linearity or foldover - **V10**
Poor horiz. linearity or foldover - **V11, V12, V13**
Narrow picture - **V11, V12, V13, V14, M1, M2**
Vert. off freq. - **V7, V10**
Horiz. off freq. - **V7, V11**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage shock hazard may be elliminated by removing the 6AX4 (V13) from its socket and connecting a 2250Ω/30 watt resistor from pin 5 of V13 to chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to the ungrounded side of C40. Connect the positive lead to chassis. Two peaks may occur during alignment of the video IF coils. Use the peak with the slug entering the coil from the end nearest the chassis. The sound trap (A5) should be tuned to the peak with the slug entering the coil from the end away from the chassis.
Remove the converter tube (V2) from its socket and replace with a (6J6) which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous. indications.
Attenuate generator output for 2 volts peak to peak on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.9MC 26.4MC	Any	Vert. Amp. thru detector (Fig.3) to pin 5 (plate) of 6CB6 (V3).	A1, A2	Adjust for response curve similar to Fig.1.
2.	"	"	"	"	"	Vert. Amp. thru 3.3KΩ to point Ⓐ. Low side to chassis.	A3, A4, A5, A6	Adjust for response similar to Fig.2. Adjust A5 for MINIMUM response at 21.9MC. A6 affects center of response. A4 affects the low frequency end of response. A3 affects the high frequency end.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set volume control for normal volume.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	.001MFD	High side to pin 8 (plate) of 6AM8 (V5A). Low side to chassis.	4.5MC (400%Mod) (50KC Swp)	4.5MC (400%Mod)	Any	Across secondary of sound output transformer (T2)	A10	Set buzz control (R8) 90 degrees from its maximum clockwise rotation. Adjust A10 for maximum 400% indication on scope.
4.	"	"	"	"	"	"	A7, A8, A9	Attenuate generator output so that signal level is below the limiting level of the 6BN6 as evidenced by background hiss and noise. Adjust A7, A8 and A9 for maximum response on scope.
5.	"	"	Not used	4.5MC (400%Mod)	"	"	R8	Use high signal generator output and adjust R8 for MINIMUM 400% indication on scope.
6.	"	"	4.5MC (400%Mod) (50KC Swp)	4.5MC	"	"	A10	With volume control at low level retouch A10 for maximum 400% indication on scope. Remove test equipment. Connect antenna and tune in weakest TV station in that area and retouch R8 for MINIMUM buzz and hiss. Tune in strongest TV station in area and adjust A10 for clearest sound.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Remove the 2250Ω/30 Watt resistor from V13 tube socket (pin 5) and replace the 6AX4 in its socket.
Complete oscillator alignmnet may not be necessary.
If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A11. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct an individual channel. If adjustment of A11 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency. The channel oscillator screws are reached through a hole just below the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the negative lead of a 3 volt battery to the tuner AGC terminal (white lead). Connect positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Fig. 6	Across antenna terminals thru pad (Fig.6).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50% on high frequency slope of response curve.
			207MC (10MC Swp	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

DENVER, COLO.

Leave bias connected as under "Oscillator Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Fig. 6	Across antenna terminals thru pad (Fig. 6).	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A24, A25, A26	Adjust for response similar to Fig. 5.
9.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If marker falls below 70% on any channel, make compromise adjustment of A24, A25, and A26 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

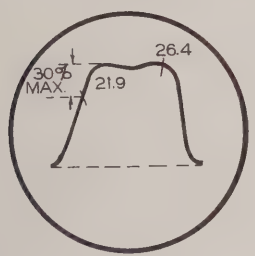


FIG. 1

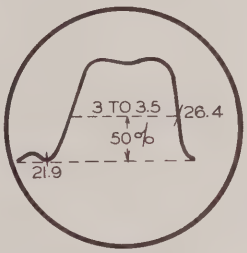


FIG. 2

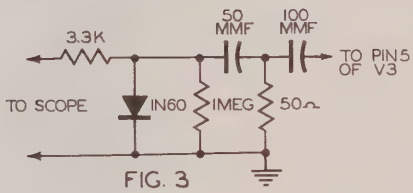


FIG. 3

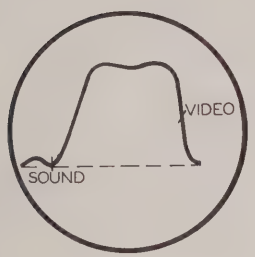


FIG. 4

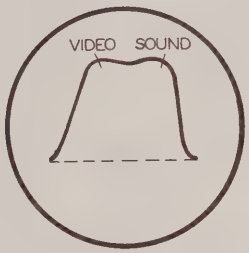


FIG. 5

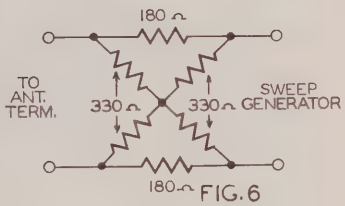
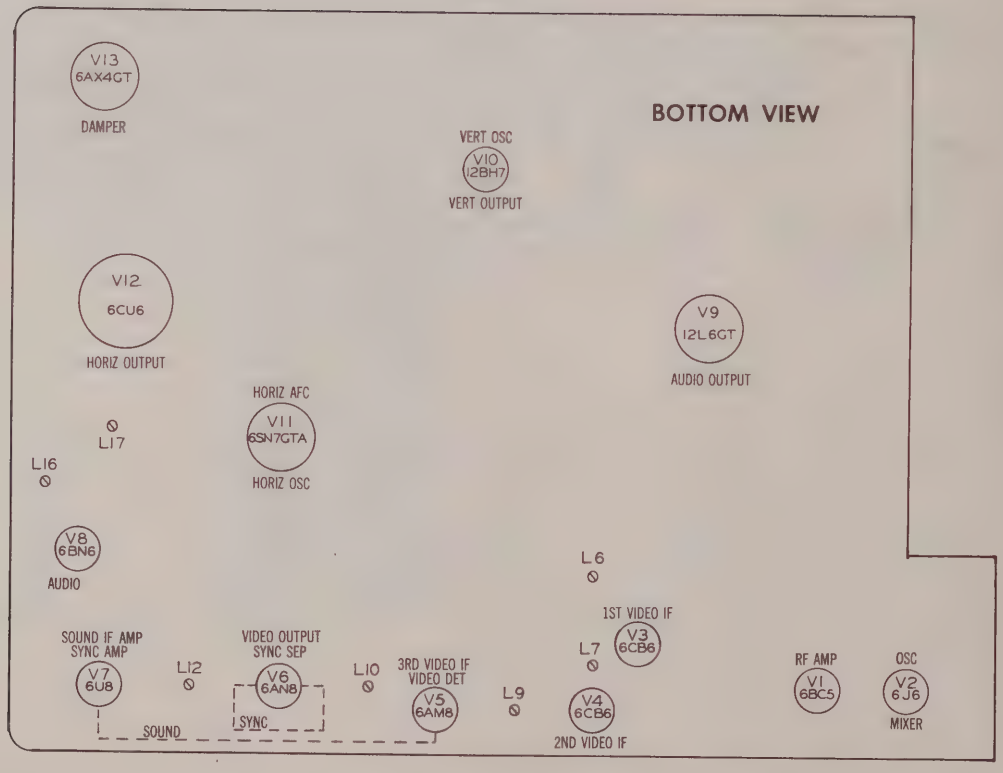


FIG. 6

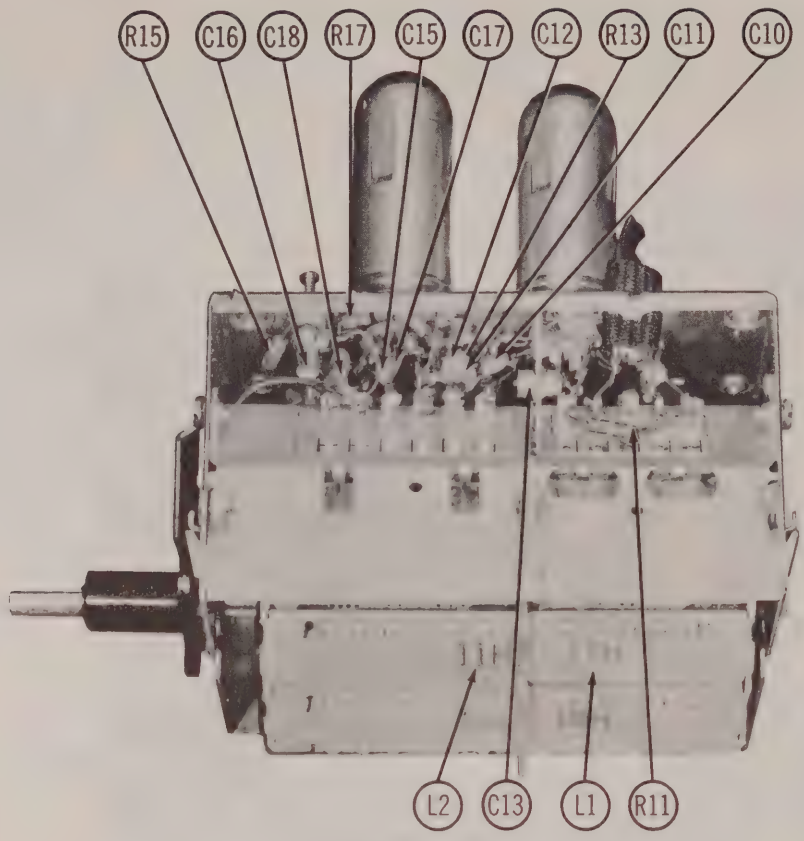
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	.1Ω	0Ω	■1. 2KΩ	■3. 4KΩ	0Ω		
V 2	6J6	■15KΩ	■15KΩ	0Ω	.1Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	.1Ω	0Ω	■1. 2KΩ	■1. 2KΩ	0Ω		
V 4	6CB6	1Meg	47Ω	.1Ω	0Ω	■1KΩ	■1KΩ	0Ω		
V 5	6AM8	180Ω	.4Ω	1KΩ	.1Ω	0Ω	1KΩ	.4Ω	5. 6KΩ	0Ω
V 6	6AN8	■820KΩ	2. 2Meg	0Ω	0Ω	.1Ω	†6. 5KΩ	†39KΩ		
V 7	6U8	■11. 5KΩ	1Ω	■18KΩ	0Ω	.1Ω	■18KΩ	150Ω	0Ω	22KΩ
V 8	6BN6	300Ω	3. 4Ω	0Ω	.1Ω	■5. 6KΩ	5Ω	†330KΩ		
V 9	12L6GT	TP	0Ω	†250Ω	†53Ω	280KΩ	TP	.4Ω	40KΩ	
V 10	12BH7	▲3Meg	600KΩ	0Ω	.1Ω	.1Ω	▲1. 5KΩ	▲3Meg	7KΩ	0Ω
V 11	6SN7GTA	750KΩ	†70KΩ	300KΩ	250KΩ	†28KΩ	0Ω	0Ω	.1Ω	
V 12	6CU6	NC	.1Ω	TP	†12KΩ	470KΩ	NC	0Ω	10Ω	TOP CAP ▲25Ω
V 13	6AX4GT	NC	NC	400KΩ	NC	†53Ω	TP	400KΩ	400KΩ	
V 14	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲386Ω
V 15	21ALP4A	0Ω	0Ω	PIN6 40KΩ	PIN 10 ▲390KΩ	PIN 11 ■350KΩ	PIN 12 .1Ω			

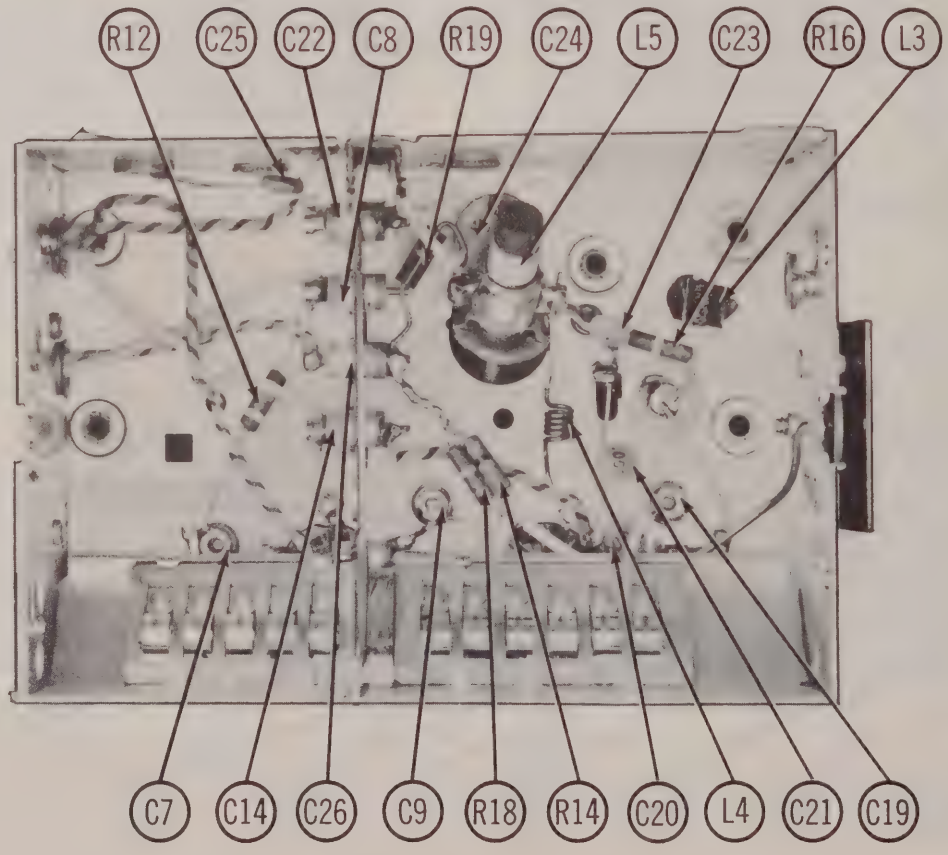
■MEASURED FROM 145V LINE.
†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V13.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

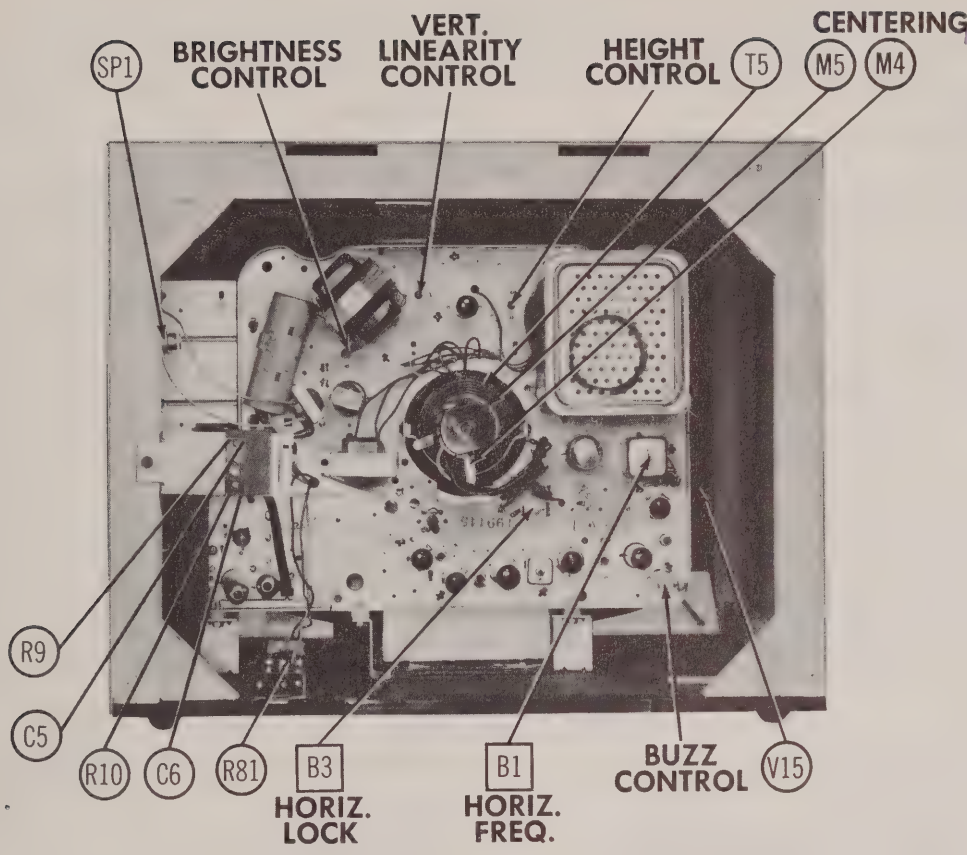


RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station.

Set the horizontal hold control to its mid-range position. If necessary adjust the horizontal frequency slug (B1) to synchronize the picture horizontally.

Connect the vertical amplifier of an oscilloscope thru a 10MMF capacitor to terminal #4 of L17. Low side to chassis. Adjust the horizontal waveform slug (B2) for waveform similar to Fig. 7. If necessary, keep the picture in sync during alignment with the horizontal hold control or B1.

Disconnect the scope. Turn the horizontal hold control fully counter clockwise. Turn B1 counter clockwise until picture loses sync with diagonal bars sloping downward to the right.

Adjust B1 clockwise until picture is just ready to fall into sync. Turn the horizontal hold control clockwise until picture loses sync. If picture is still in sync at maximum clockwise rotation of horizontal hold control switch off channel and back so that picture will fall out of sync. Turn horizontal hold control slowly counter clockwise and note the number of diagonal bars present just before picture pulls into sync. If more than 3 bars are present adjust the horizontal lock trimmer (B3) slightly clockwise. If less than 2 bars are present adjust B3 slightly counter clockwise. Check horizontal hold control action. Picture should pull into sync within 60 degrees from fully counter clockwise of horizontal hold control.

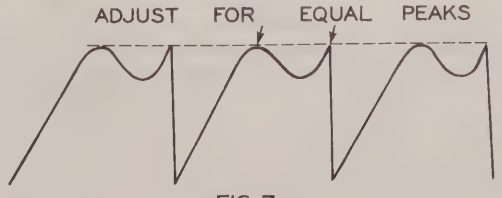


FIG. 7

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check M1 and M2. Check T3, T5A, R81, R78, C70 and other associated components.

DRIVE LINES

Check by substitution V12 and V13. Check C69, C70, R78, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V12 and V13. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines."

PIE CRUST EFFECT

Check by substitution V11, V12 and V13. Check C65, C64, R72 for open. Check L17, R2, R67 and other associated components.

XMAS TREE EFFECT

Check by substitution V11, V12 and V13. Check T3 and T5 for internal arcing. Check L17, R70, R69, C66, C63 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V10. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C2D, C4, R63, R64 and other associated components.	Check T2, R61, R7, C59 and other associated components.

INSUFFICIENT SWEEP

Substitute V10. Check height and vertical linearity controls for proper operation. Check R61, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V10. Check R61, R7, T2 and other associated components.

COMPRESSED AT TOP

Substitute V10. Check R6, R63, R64, R62, T4 and other associated components.

FOLDS

Substitute V10. Check C60, T2, T4, T5B, R61 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V7. Check C54, C55, C56, R55, R57, R58, R59 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V10. Check vertical integrator network. Check C58, C59, T2, R1 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V11. Check C62, C64, C65, R69, R2, L17 and other associated components.

HORIZONTAL BENDING

Check by substitution V6, V7 and V11. Check components associated with V11.

VIDEO

LOSS OF VIDEO

Substitute V6. Check C43, C2C, R42, R39, R40 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A7. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control. Check C41, C43, L13, L14, R39, R40 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check L13, L14, C41, C43 and other associated components.

SMEAR

Substitute V6. Check L11, L13, L14, R39, R40, C41, C43 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8 and V9. Check stage V9 using audio signal generator. Apply audio signal across C51.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C51, C52, C53, R48, R51, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments A10 and R8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound."

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check M1, M2, C1 and R81. Check B+ filter and decoupling network.

SMALL AND/ON DIM PICTURE

Check M1, M2, C1 and R81. Check B+ filter and decoupling network.

COMPARISON OF 1600D SERIES CHASSIS

The 1600D, Run 1 chassis may be considered the basic chassis in the 1600D Series. Run numbers shown below will indicate variations from this standard by one or more modifications.

CHASSIS	PICTURE TUBE SIZE	PICTURE TUBE TYPE	TYPE OF HEATER CIRCUIT	VHF TUNER	MODIFICATIONS
B1600D					
Run 1	21"	21ALP4A Glass	Transformer	1D2017	----
Run 2	21"	21ALP4A Glass	Transformer	1D2017	I, II, III
Run 2A	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, IV
Run 3	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, VI
Run 3A	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, IV, VI
E1600D					
Run 1	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, V
Run 1A	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, IV, V
Run 2	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, V, VI
Run 2A	21"	21ALP4A Glass	Transformer	1D2017	I, II, III, IV, V, VI

MODIFICATION I

LOCATION OF CHANGE	CHANGE MADE
A. Center arm of height control (R7).	C4 decreased from 20MFD to 10MFD.
B. Power supply	C1 increased from 140MFD to 200MFD, 150V.
C. Plate of video output (pin 6 of V6).	L13 part number changed from 51A1855 to 51A1875.
	L14 part number changed from 51A1856 to 51A1876.
D. Grid of sync separator (pin 2 of V6).	Sync take-off network changed from part #49A045 to part #49A046.
E. Picture tube support bracket.	C76 added across R82.
F. Plate of damper (pin 5 of V13).	C72 added from pin 5 of V13 to ground.
G. Plate of sync amplifier (pin 1 of V7).	C56 added from pin 1 of V7 to ground.

MODIFICATION II

LOCATION OF CHANGE	CHANGE MADE
A. Grid of video output (pin 8 of V6).	Sound take-off moved from the plate to the grid of V6.

MODIFICATION III

LOCATION OF CHANGE	CHANGE MADE
A. Vertical output stage.	T4, vertical output transformer, changed to part #55B260. (See parts list for replacement data).
B. Cathode of vertical output (pin 8 of V10).	R62 added from pin 8 of V10 to ground.
	R63 is increased from 18KΩ to 68KΩ.

MODIFICATION IV

LOCATION OF CHANGE	CHANGE MADE
A. Power supply	T1, filament transformer changed from part #52C322 to part #52C341 (See parts list for replacement data).
B. Audio Output	V9 changed from 25L6GT to 12L6GT.

MODIFICATION V

LOCATION OF CHANGE	CHANGE MADE
A. Top of chassis.	A top chassis support bracket (part #67B2989) used on Ch. E1600D; it also replaces part #67B2716 on Ch. B1600D.

MODIFICATION VI

LOCATION OF CHANGE	CHANGE MADE
A. Horizontal output grid (pin 5 of V12).	R77 decreased from 470KΩ to 390KΩ.
B. Horizontal output cathode (pin 8 of V12).	R79 is omitted.
C. Horizontal output grid (pin 5 of V12).	C70 increased from 1000MMF to 2000MMF.
D. Damper cathode (pin 3 of V13).	C73 decreased from 68MMF to 56MMF.
E. Horizontal output circuit.	T3, horizontal output transformer, changed to part #55B266.
F. Damper cathode (pin 3 of V13).	A coil (part #53A207) added from pin 3 of V13 to pin 1 of new flyback.
	C69 removed from ground and connected to pin 5 of V12.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Hallicrafters PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp. - Video Detector	6AM8	6AM8	9CY	
V6	Video Output - Sync Sep.	6AN8	6AN8	9DA	
V7	Sound IF Amp. - Sync Amp.	6U8	6U8	9AE	
V8	Audio Det.	6BN6	6BN6	7DF	
V9	Audio Output	12L6GT	12L6GT	7S	
V10	Vert. Osc. - Vert. Output	12BH7	12BH7	8A	
V11	Horiz. AFC - Horiz. Osc.	6SN7GTA	6SN7GTA	8BD	
V12	Horiz. Output	6CU6	6CU6	8AM	
V13	Damper	6AX4GT	6AX4GT	4CG	
V14	HV Rectifier	1X2B	1X2B	9Y	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: Hallicrafters PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V15	21ALP4A ①	21ALP4A ① 21ALP4	21ALP4A ①	21ALP4A② 21ALP4 21ALP4B ②	21ALP4A ① 21ALP4	LLL	① Aluminized ② Silver Screen

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: Hallicrafters PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	200	150	45B265	WS-342	TD-200-200	S-10	
C2A	160	300	45B263	WQ-505	CDB-1008	Q-162	
B	200	150					
C	5	300					
D	30	150					
C3A	200	150	45B260	WD-345	TDL-205	D-088	
B	5	150					
C4	20	450	45B261	TC76	TD-20-450	FM-4520	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: Hallicrafters PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C5	470	500	47X20B471M	D6-471	GP2K-471	MC245	
C6	470	500	47X20B471M	D6-471	GP2K-471	MC245	
C7	3-8		44A434	829-10			
C8	1000		12IA365				
C9	.5-3		12IA158	829-3	3115-01-OR5	CT65A	
C10	1000		12IA159	DD-102	801-001	DC-521	
C11	220		12IA366	DD-121	811-121	UC-5312	
C12	220		12IA366	DD-121	811-121	UC-5312	
C13	1000		12IA365				
C14	1000		12IA365				
C15	220		12IA366	DD-121	811-121	UC-5312	
C16	.5-3		12IA158	829-3	3115-01-OR5	CT65A	
C17	10		12IA369				
C18	2.2		12IA368				
C19	.5-3		12IA158	829-3	3115-01-OR5	CT65A	
C20	1000		12IA159	DD-102	801-001	DC-521	
C21	1000		12IA159	DD-102	801-001	DC-521	
C22	1000		12IA365				
C23	8.2		12IA367				
C24	43		12IA170	TCZ-43	NPOL-430		
C25	220		12IA164	DD-121	811-121	UC-5312	
C26	1000		12IA365				
C27	.05	200	46AU503J	DF-503		PT415	
C28	5000		47A168	DD-502	811-005	DC-525	
C29	1000		47A230	DD-102	801-001	DC-521	
C30	5000		47A168	DD-502	811-005	DC-525	
C31	5000		47A168	DD-502	811-005	DC-525	
C32	1000		47A230	DD-102	801-001	DC-521	
C33	68	500		D6-680	811-680		
C34	1000		47A230	DD-102	801-001	DC-521	
C35	5000		47A168	DD-502	811-005	DC-525	
C36	5000		47A168	DD-502	811-005	DC-525	
C37	1000		47A230	DD-102	801-001	DC-521	
C38	10		47CA20100F	D6-100	GPUK-101	UC-541	
C39	4.7		47A180-6	TCZ-4R7	NPOK-4R7	ZT-555	
C40	.25	100	46A343			PT4025	
C41	.1	150	46A343	DF-104		PT401	
C42	33		47A478				
C43	.1	400	46AY104J	DF-104		PT401	
C44	4.7		47A180-6	TCZ-4R7	NPOK-4R7	ZT-555	
C45	68		47A479				
C46	5000		47A168	DD-502	811-005	DC-525	
C47	33		47A478				
C48	15		47A480				
C49	5000		47A168	DD-502	811-005	DC-525	
C50	.01	400	46AU103J	DE-103	GP2-333-103	PT411	
C51	1000		47A230	DD-102	801-001	DC-521	
C52	.02	200	46AU203J	DF-203	817-02	PT612	
C53	.02	600	46AZ203J	DF-203	817-02	PT612	
C54A	270				GP2K-271	UC-5327	
B	10000		†49A046	†PC-383	811-01	DC-511	
C54					GPUK-250	UC-5425	
C55	.05	200	46AU503J	DF-503		PT415	
C56	33		47CA30A330M	D6-330	GPUK-330	UC-5453	
C57A	5000		*49A044	*PC-108	811-005	DC-525	
B	5000				811-005	DC-525	
C58	.01	400	46BR103E4	D6-103	GP2-333-103	PT411	

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: Hallicrafters PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C59	470		47CA3047K	D6-471	GP2K-471	UC-5347	
C60	.047	400	46BR473E4	DF-503		PT4147	
C61	5000		47A168	DD-502	811-005	DC-525	
C62	20		47CA20200K	D6-200	GPUK-200	UC-542	
C63	.05	400	46AW503J	DF-503		PT415	
C64	.02	400	46AU203J	DF-203	817-02	PT412	
C65	.25	100	46A243			PT4025	
C66	33		47A478				
C67	220	500	47X20B221K	D6-221	811-221	MCB240	
C68	.01	400	46C344	D6-103	GP3-333-103	PT411	
C69	1200	500	47X30B132K				
C70	1000		47A503	DD-102	801-001	DC-521	
C71	.05	400	46AW503J	DF-503		PT415	
C72	10000		47A324	DD-103	811-01	DC-511	
C73	68	3000	47A473	DD30-680	3KV-680	DC30468	
C74	.08	200	46AU803J				
C75	68	3000	47A473	DD30-680	3KV-680	DC30468	
C76	5000	1000	47A485	DD-502	1R5KV-472		

† Items C54A, C54B, C54C, R54A and R54B are combined in one unit.
* Items C57A, C57B, R60A and R60B are combined in one unit.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1.25Meg	½	25B1097	Q11-1387	A47-1Meg-S†	B-69†	TA16L†	Vertical Hold Stop at 350KΩ
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A.
R2A	145KΩ	½	25B1100	Q11-1358	A47-75K-S*	B-35*	U-43*	Horizontal Hold Stop at 70KΩ
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	330KΩ	½	25B1101	Q13-132	A47-500K-Z	B-60-S	TA334A	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
C	Switch		Not Req.	76-1	SWE-12	Not Req.	U5-26	Attach to R3A.
R4A	1500Ω	½	25B1102	Q17-109		AB-515	U-5	Contrast
B	Shaft		Not Req.	Not Req.		AK-3	Not Req.	Attach to R4A.
R5A	5Meg	½	25B1096	Q17-141			TAP56R	Brightness
B	Shaft		Not Req.	TQ			TAP75LL	Attach to R5A.
R6A	750Ω	½	25B1099	Q11-105	A47-750-S	AB-5		Vertical Linearity
B	Shaft		Not Req.	TQ	RN-3	AK-10		Attach to R6A.
R7A	5Meg	½	25B1096	Q11-141*	A47-1Meg-S*	AB-86*		Height Stop at 1Meg.
B	Shaft		Not Req.	TQ	RN-3	AK-10		Attach to R7A.
R8	500Ω	2	25A1095		39-500			Buzz

† Connect a 350KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down).
* Connect a 70KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down).
▪ Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down).

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: Hallicrafters PART No.	IRC PART No.	NOTES
R9	470KΩ	½	23X20X474K	BTS-470K	
R10	470KΩ	½	23X20X474K	BTS-470K	
R11	15KΩ	½	23X20X153K		
R12	47KΩ	½	23X20X473K		
R13	2200Ω	½	23X20X222K	BTS-2200	
R14	1000Ω	½	23X20X102K	BTS-1000	
R15	4700Ω	½	23X20X472K	BTS-4700	
R16	220KΩ	½	23X20X224K		
R17	10KΩ	½	23X20X103K		
R18	15KΩ	½	23X20X153K		
R19	15KΩ	½	23X20X153K		
R20	1000Ω	½	23X20X102K	BTS-1000	
R21	2700Ω	½	23X20X272K	BTS-2700	
R22	15KΩ	2	23X20X153K		
R23	1000Ω	½	23X20X102K	BTS-1000	
R24	47Ω	½	23X20X470K	BTS-47	
R25	4700Ω	½	23X20X472K	BTS-4700	
R26	220Ω	½	23X20X221K	BTS-220	
R27	1000Ω	½	23X20X102K	BTS-1000	
R28	1000Ω	½	23X20X102K	BTS-1000	
R29	47Ω	½	23X20X470K	BTS-47	
R30	8200Ω	½	23X20X822K		Note 1
R31	18KΩ	½	23X20X183K		
R32	1000Ω	½	23X20X102K	BTS-1000	
R33	1000Ω	½	23X20X102K	BTS-1000	
R34	180Ω	½	23X20X181K	BTS-180	
R35	1Meg	½	23X20X105K		
R36	5600Ω	½	23X20X562K	BTS-5600	
R37	1Meg	½	23X20X105K		
R38	8200Ω	½	23X20X822K		
R39	10KΩ	2	23X40X103K		
R40	18KΩ	1	23X30X183K		
R41	47KΩ	1	23X30X473K		
R42	39KΩ	1	23X30X393K		
R43	390KΩ	½	23X20X394K	BTS-390K	
R44	820KΩ	½	23X20X824K	BTS-820K	
R45	100KΩ	½	23X20X104K		
R46	18KΩ	½	23X20X183K	BTS-18K	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: Hallicrafters PART No.	IRC PART No.	NOTES
R47	150Ω	½	23X20X151K	BTS-150	
R48	470Ω	½	23X20X471K	BTS-470	
R49	5600Ω	1	23X30X562K	BTA-5600	
R50	560KΩ 5%	½	23X20X564J	BTS-560K 5%	
R51	470KΩ 5%	½	23X20X474J	BTS-470K 5%	
R52	1000Ω	½	23X20X102K	BTS-1000	
R53	10KΩ	½	23X20X103K		
R54A	220KΩ	½	†49A046		
B	2.2Meg	½			
R55	820KΩ	½	23X20X824K		
R56	22KΩ	½	23X20X223K		
R57	680KΩ	½	23X20X684K		
R58	6800Ω	1	23X30X682K	BTA-6800	
R59	4700Ω	½	23X20X472K	BTS-4700	
R60A	22KΩ	½	*49A044		
B	10KΩ	½			
R61	680KΩ	1	23X30X684K		
R62	15KΩ	2	23X40X153K	BTB-15K	
R63	68KΩ	2	23X20X683K	BTB-68K	
R64	15KΩ	2	23X40X153K	BTB-15K	
R65	560Ω	½			
R66	56KΩ	½			
R67	560KΩ	½	23X20X564K		
R68	27KΩ	½	23X20X273K		
R69	100KΩ	½	23X20X104K		
R70	150KΩ	½	23X20X154K		
R71	150KΩ	½	23X20X154K		
R72	8200Ω	½	23X20X822K		
R73	150KΩ	½	23X20X154K		
R74	100KΩ	½	23X20X104K		
R75	2.7Meg	½	23X20X275K		
R76	18KΩ	½	23X20X183K		
R77	470KΩ	½	23X20X474K		
R78	12KΩ	2	23A097		
R79	10Ω	½	23X20X100K		
R80	4700Ω	½	23X20X472K		
R81	7.2Ω	5	25B101		
R82	33KΩ	1	23X30X333K	BTA-33K	

Note 1. Some versions use a 10KΩ ½ watt in this application.
† Items C54A, C54B, C54C, R54A, R54B are combined in one unit.
* Items C57A, C57B, R60A, R60B are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING: PRI	SEC 1	SEC 2	REPLACEMENT DATA: Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC Tap ④ .58A 25VAC Tap ④ .3A 6.3VAC Tap ④ 5.8A	6.3VAC ④ 1.2A		52C341					26F64	

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	55B250		A-3006					
T3	Horiz. Output Trans.	55B255	#B418*	EVO-37*		X123*	A-8263*	FLY-35*	D-48*
		55B266 ①							
T4	Vert. Output Trans.	55B260 ②		A-2824					
		55C254 ③							
T5A	Yoke Horiz. (20MH)	55D325 ④	DF607 ⑤	MDF-92			DY-16A ⑥	Y-16 ⑤	Y-41-1 ⑤
B	Vert. (40MH)		⑤ ⑦				⑦	⑦	⑤ ⑦

① Alternate Part No.
② Used in chassis B1600D run 2 & 2A, E1600D run 1 & 1A.
③ Used in chassis B1600D run 1.
④ Includes capacitor C75, resistors R65, R66.
⑤ Use original yoke rear cover and centering device.
⑥ Use original horizontal damping network.
⑦ Jumper terminals # 3 & #5.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS		Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	H. V.	4	7	7		H. V.	7	H. V.	7
	4	3	6	6		3	6	6	6
	7	1	3	3		7	3	3	3
	2	5	5	5		2	5	5	5
	6	2	2	2		6	2	2	2
Connect Width Coil Across →									
Special Notes →	⑧	⑨							

⑧ Connections for Part 55B266.
⑨ Connections for Part 55B253.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	2.2KΩ	3.5Ω	55B248	Z1101	A-3025	A-3332	26S58 ①	S-12K	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: Hallicrafters PART No.	QUAM PART No.	NOTES
SPK	4"	PM	3.5Ω	85C175 ①	4A07	① Used in Models 21K340M, 21K340B, 21T320W, 21T320M, and 21T320B.
	6"	PM	3.5Ω	85C177 ②	6A1	② Used in Models 21K330M and 21K330B.

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	SEC.	REPLACEMENT DATA: Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	00CT	0Ω	12IA340				Channel 2
B	Ant. Coil	00CT	0Ω	12IA341				Channel 3
C	Ant. Coil	00CT	0Ω	12IA342				Channel 4
D	Ant. Coil	00CT	0Ω	12IA343				Channel 5
E	Ant. Coil	00CT	0Ω	12IA344				Channel 6
F	Ant. Coil	00CT	0Ω	12IA345				Channel 7
G	Ant. Coil	00CT	0Ω	12IA346				Channel 8
H	Ant. Coil	00CT	0Ω	12IA347				Channel 9
I	Ant. Coil	00CT	0Ω	12IA348				Channel 10
J	Ant. Coil	00CT	0Ω	12IA349				Channel 11
K	Ant. Coil	00CT	0Ω	12IA350				Channel 12
L	Ant. Coil	00CT	0Ω	12IA351				Channel 13
L2A	RF, Mixer Grid, Osc. Coils	0Ω		12IA352				Channel 2
B	RF, Mixer Grid, Osc. Coils	0Ω		12IA353				Channel 3
C	RF, Mixer Grid, Osc. Coils	0Ω		12IA354				Channel 4
D	RF, Mixer Grid, Osc. Coils	0Ω		12IA355				Channel 5
E	RF, Mixer Grid, Osc. Coils	0Ω		12IA356				Channel 6

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
F	RF, Mixer Grid, Osc. Coils	0Ω		121A357				Channel 7
G	RF, Mixer Grid, Osc. Coils	0Ω		121A358				Channel 8
H	RF, Mixer Grid, Osc. Coils	0Ω		121A359				Channel 9
I	RF, Mixer Grid, Osc. Coils	0Ω		121A360				Channel 10
J	RF, Mixer Grid, Osc. Coils	0Ω		121A361				Channel 11
K	RF, Mixer Grid, Osc. Coils.	0Ω		121A362				Channel 12
L	RF, Mixer Grid, Osc. Coils	0Ω		121A363				Channel 13
L3	Fil. Choke	0Ω		121A051				
L4	RF Coil	0Ω		121A151				
L5	Conv. Plate	.7Ω		121A383				
L6	1st Video IF	.4Ω		51A1861	17-1003*	TV-102*	6171A	
L7	2nd Video IF	.3Ω	.3Ω	51A1854	17-1062		6250	
L8	Fil. Choke	0Ω		53A282	19-3001		6175	.4 Microhenries
L9	3rd Video IF	.4Ω	.4Ω	51A1862			6253	Includes 21.9MC Trap.
L10	4th Video IF	.4Ω	.4Ω	50A623			6187*	
L11	Series Peaking Coil	4.4Ω		53A307	19-1006		4624	16 Microhenries
L12A	4.5MC Trap	2.8Ω						
B	1st Sound IF	1Ω		51A1858				
L13	Shunt Peaking Coil	16Ω		51A1875	19-4950■		4652■	1000 Microhenries, Wound on 15KΩ resistor.
L14	Series Peaking Coil	11Ω		51C1876	19-3500▲		6138▲	465 Microhenries, Wound on 68KΩ resistor.
L15	2nd Sound IF	1.7Ω	3.4Ω	51A1859				
L16	Quadrature Coil	5Ω		51A1857	20-1005	TV-151	1480	
L17	Horiz. Osc.	17Ω	36Ω	50C648	20-1402♦	TV-162♦	6183♦	Waveform Winding=35Ω
L18	RF Choke	3.8Ω						

* Detune Trap.
■ Parallel with 15KΩ resistor.
▲ Parallel with 68KΩ resistor.
♦ Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L19	.200ADC	53Ω	.85HY	51B187	C5040	C-2994	C-2327	26C41	C-21X ①

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: Hallicrafters PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.200A DC	27A173-B	1028A	RS-250	6S250	6Q4	250	
M2	.200A DC	27A173-B	1028A	RS-250	6S250	6Q4	250	

MISCELLANEOUS

ITEM No.	PART NAME	Hallicrafters PART No.	NOTES
M3	Tuner	1D2017	VHF
M4	Centering Device		Part of deflection yoke back cover (T5).
M5	Ion Trap	21B189	
B3	Trimmer Cap.	44A448	Horiz. Lock-10-160MMF)
	Cabinet	78F1129	Model 21T320W
	Cabinet	78A1139	Model 21T320M
	Cabinet	78A1140	Model 21T320B
	Cabinet	78F1163	Model 21K340M
	Cabinet	78A1164	Model 21K340B
	Cabinet	78E1145	Model 21K330M
	Cabinet	78A1148	Model 21K330B
	Knob	15A769	Channel Selector-Models 21K340M, 21T320W, 21T320M, 21K330M
	Knob	15A797	Channel Selector-Models 21K340B, 21T320B, 21K330B
	Knob	15A775	Contrast, Horiz. Hold, Vert. Hold, On-Off-Volume-Models 21T320W, 21T320M
	Knob	15A798	Contrast, Horiz. Hold, Vert. Hold, On-Off-Volume-Models 21T320B, 21K340B, 21K330B
	Knob	15C775	Contrast, Horiz. Hold, Vert. Hold, On-Off-Volume-Models 21K340M, 21K330M
	Knob	15A762	Fine Tuning-All Models
	Safety Glass	22A424	
	Mask	7E575	Model 21T320W
	Mask	7A584	Models 21T320M, 21T320B, 21K330M, 21K330B,
	Mask	7A575	Models 21K340M, 21K340B

PROPERTY OF
L. F. BLANKENSHIP
3924 MITCHELL ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V11, V12, V13 and V14. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C73, C71, C72, C74, R78 and other associated components.	Check L17, C63, C67, C68, C70, C69, R68, R69 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V12 and V13. Check M1 and M2. Check C1, C70, R81, R78 and other associated components.

BLOOMING

Check by substitution V12, V13 and V14. Check M1 and M2. Check C1, C70, R78, R81 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video."

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound."

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V9. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set."

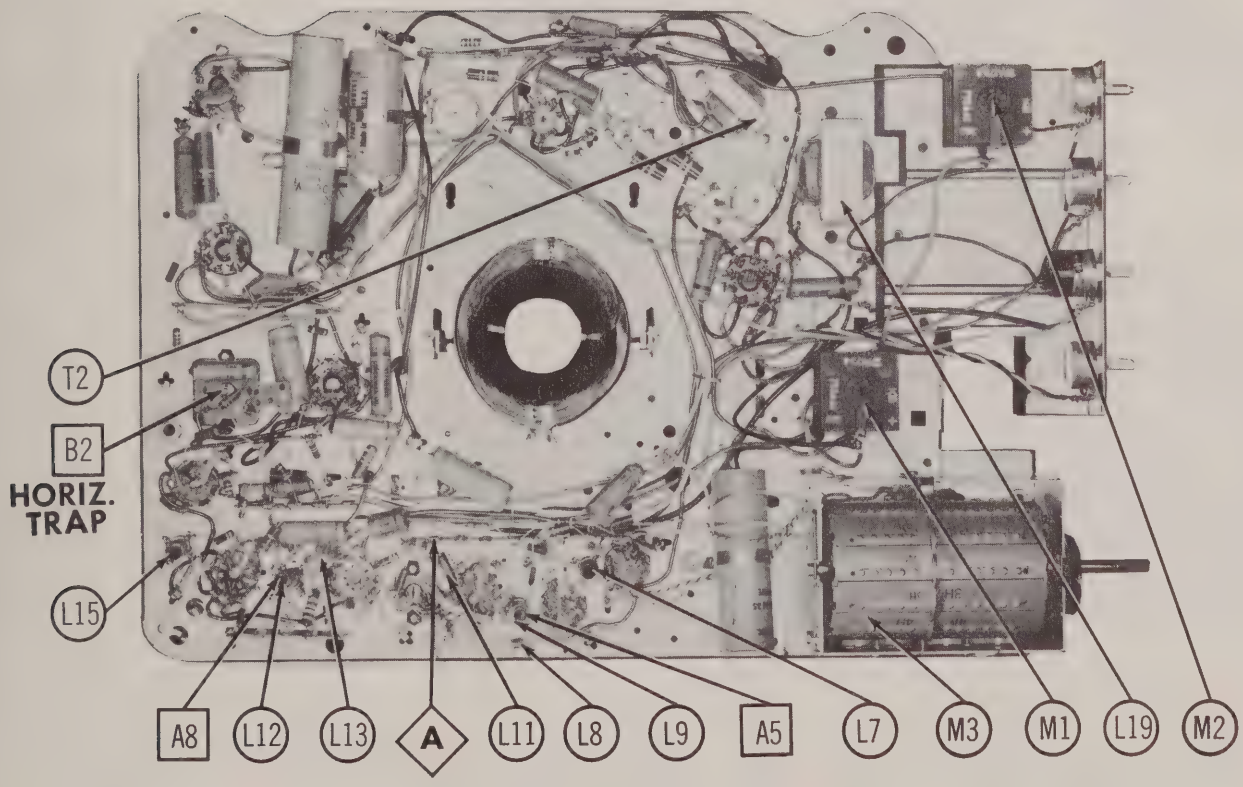
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet right below the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 5 wood screws holding plastic strip at the top of the safety glass. Remove plastic strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (L17) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control located on rear apron of chassis for maximum volume and minimum buzz. If results are unsatisfactory see alignment of "Sound IF Using FM Signal Generator and Oscilloscope".

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly located.

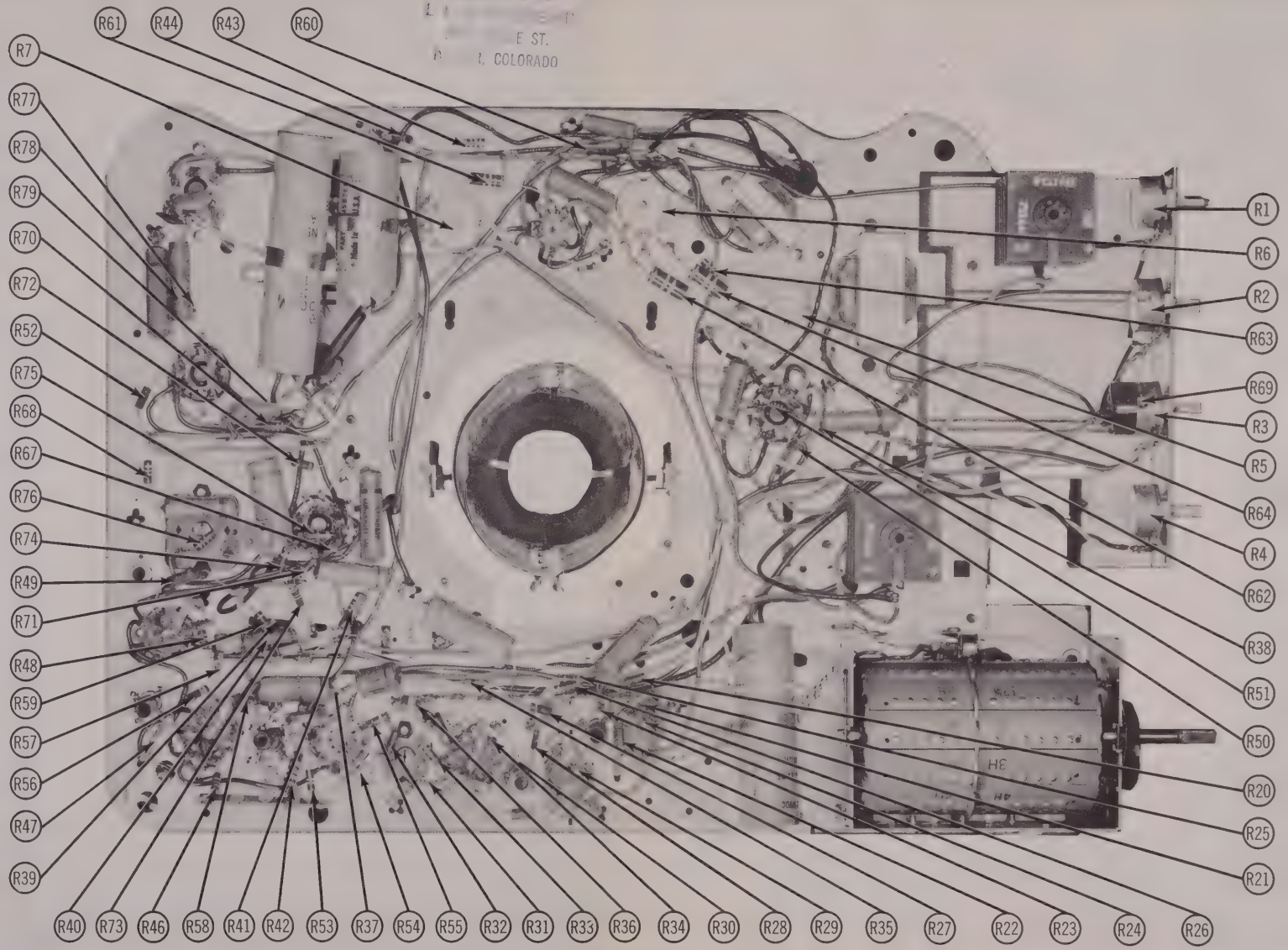
DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL - TABLE MODELS

1. Remove 6 push-on type control knobs from side panel of cabinet.
2. Remove 5 wood screws. Remove rear cover.
3. Remove 1 wood screw. Remove antenna terminal bracket.
4. Unsolder two speaker leads.
5. Remove 2 wood screws from chassis bracket at the top rear of cabinet.
6. Remove 2 wood screws from wood corners on each side of cabinet rear.
7. Remove 6 hex head screws from along each side and 3 wood screws from the front underside of the cabinet.
8. Lift cabinet straight up and off chassis mounting board.
9. Remove 2 wing nuts . Remove speaker.

CHASSIS REMOVAL - CONSOLE MODELS

1. Perform steps 1, 2, 3 and 4 as above.
2. Remove 4 chassis mounting board bolts from cabinet shelf.
3. Remove chassis with mounting board from cabinet.
4. Remove 2 wing nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

METEOR MODELS 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)

PROPERTY OF
L. F. BLANKENSHIP
3014 MEADE ST.
DENVER, COLORADO

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL 4104

METEOR MODELS 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

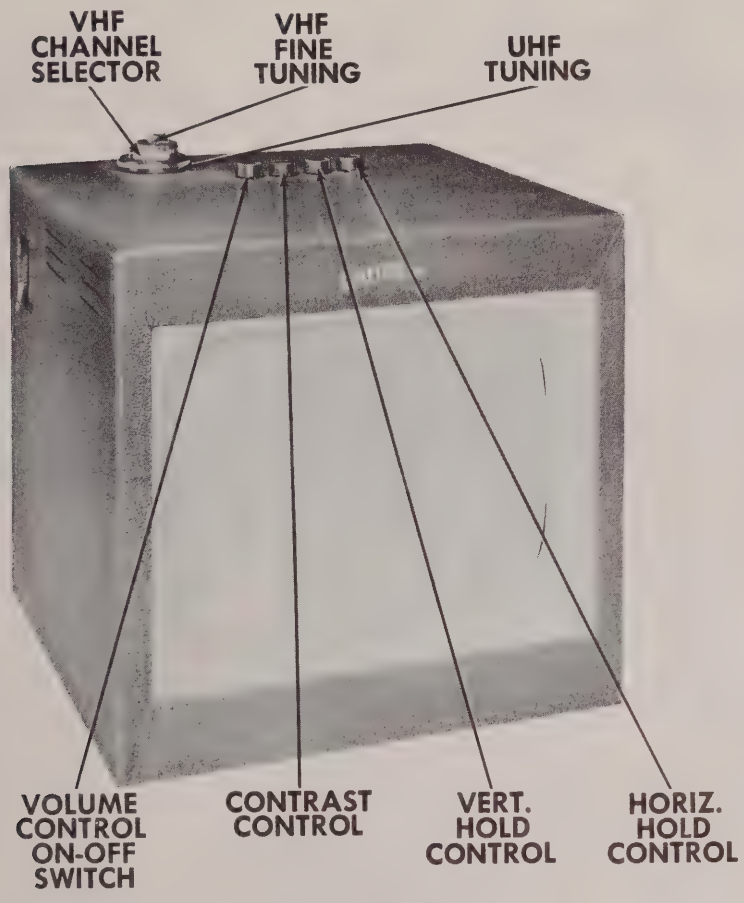
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 298 FOLDER 7

PHOTOFACT* Folder
*TRADE MARK

METEOR MODELS 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)

PROPERTY OF
T. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



METEOR MODEL 4104

TRADE NAME	Meteor Models 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.34 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

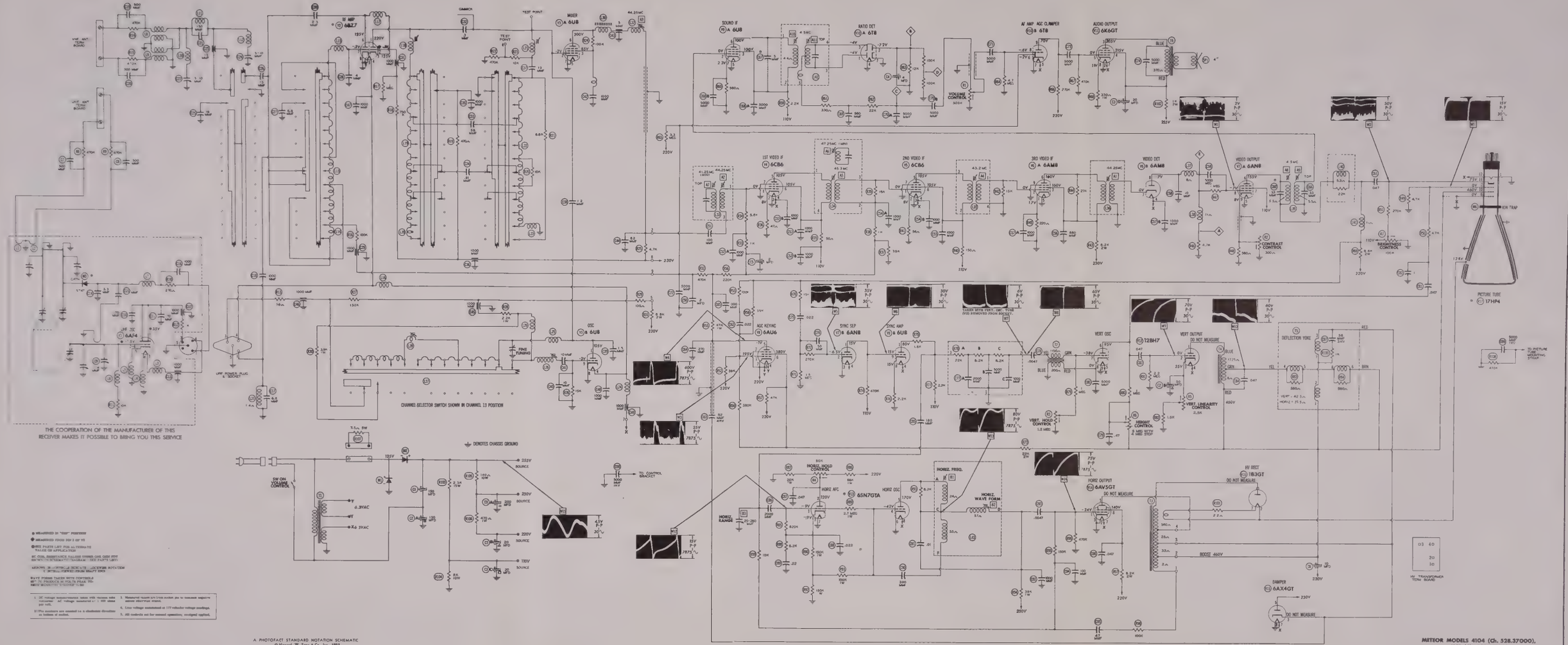
Alignment Instructions 10
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions 14, 15, 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 12, 17
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 13
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 6, 7
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

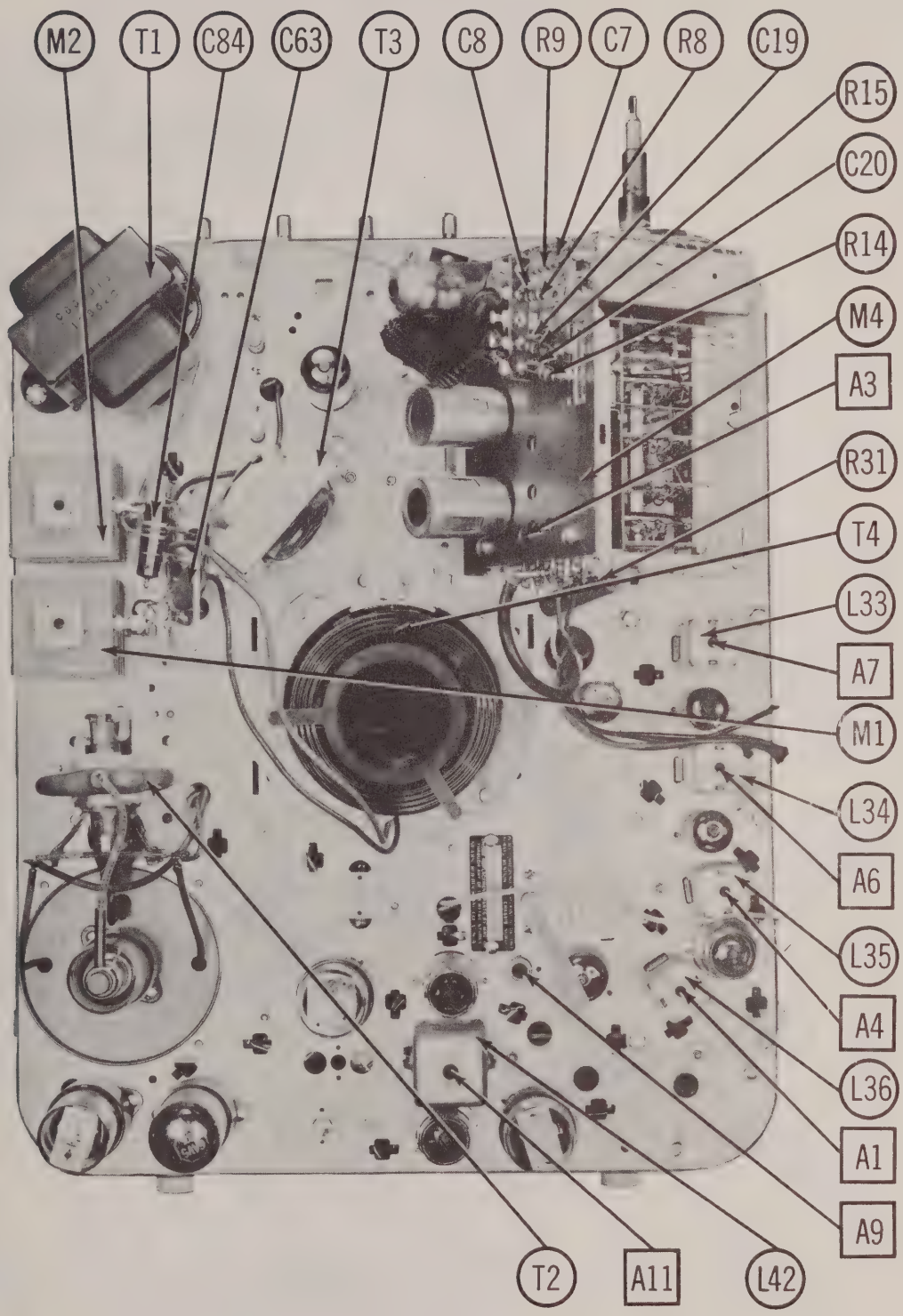
DATE 11-55 SET 298 FOLDER 7

METEOR MODELS 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)



A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1951

METEOR MODELS 4104 (Ch. 528.37000), 4121 (Ch. 528.37100)



CHASSIS TOP VIEW

SET 298 FOLDER 7

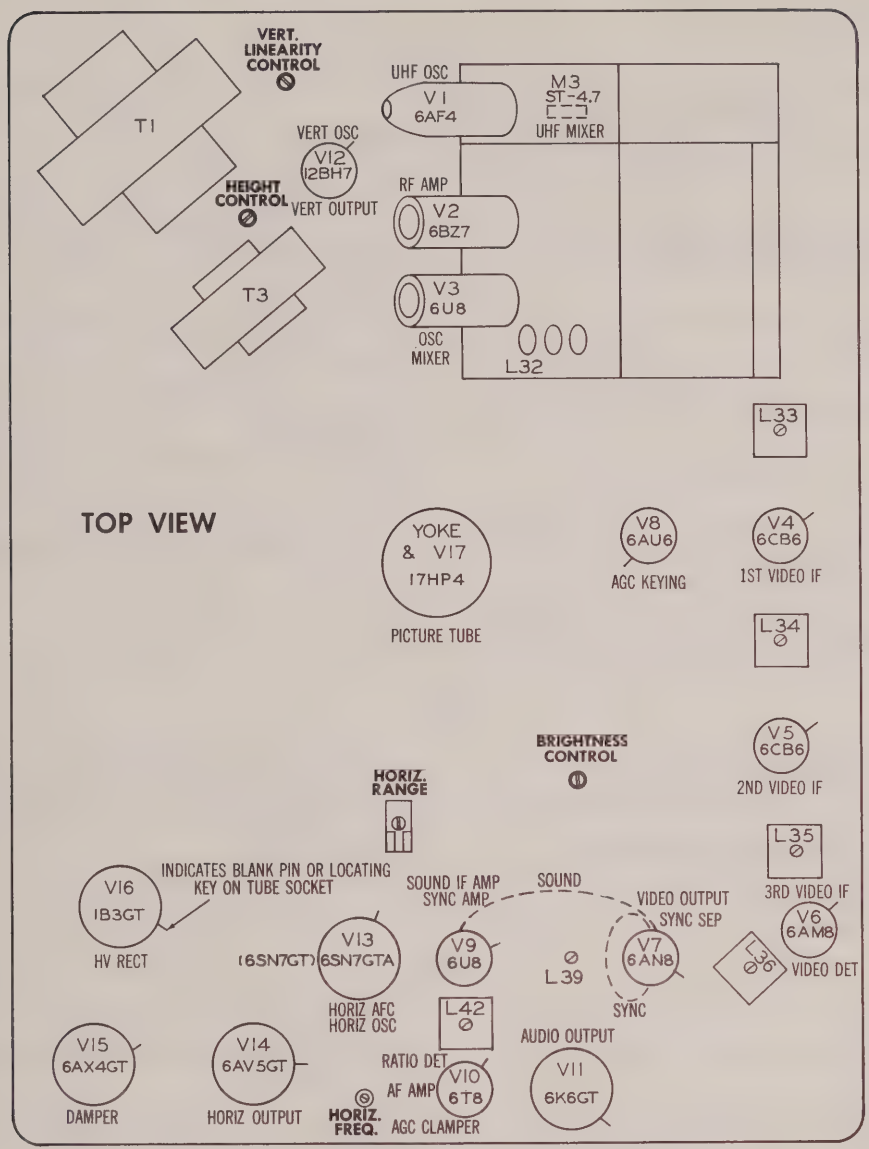
PROPERTY OF
J. F. BLANKENSHIP
3924 MENDE ST.
DENVER, COLORADO

METEOR MODELS
4104 (Ch. 528.37000), 4121 (Ch. 528.37100)

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V7, V8, V17**
Has pic, no sound - **V9, V10, V11**
Overloaded picture - **V8, V10**

SYNC FAILURE
No vert. sync - **V9, V12**
No horiz. sync - **V9, V13**
No vert. or horiz. sync - **V7, V9**

SWEEP FAILURE
No raster, has sound - **V13, V14, V15, V16, V17**
No vertical deflection - **V12**
Poor vert. linearity or foldover - **V12**
Poor horiz. linearity or foldover - **V13, V14, V15**
Narrow picture - **V13, V14, V15, V16, M1, M2**
Vert. off freq. - **V9, V12**
Horiz. off freq. - **V9, V13**

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V14 and V15. Check M1 and M2. Check C94, C93, R97, R107, T3, T5A and other associated components.

DRIVE LINES

Check by substitution V14 and V15. Check C94, C93, R95, R97, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V14 and V15. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V13, V14 and V15. Check C89 and C88 for open. Check L43, R88, R86, R87, R4 and other associated components.

XMAS TREE EFFECT

Check by substitution V13, V14 and V15. Check T3 and T5 for internal arcing. Check L43, C85, C89, C90, R93, R99 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V12. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R82, R5, C2B and other associated components.	Check T2, C79, C83, C78, R79, R80 and other associated components.

INSUFFICIENT SWEEP

Substitute V12. Check height and vertical linearity controls for proper operation. Check R80, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V12. Check T2, C79, R80, R6 and other associated components.

COMPRESSED AT TOP

Substitute V12. Check R82, R5, C2B, T4, T5B and other associated components.

FOLDS

Substitute V12. Check T2, C83, C79, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V7 and V9. Check C76, C75, R74, R75, R77 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check vertical integrator network. Check T2, R79, C78, C80 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Substitute V13. Check C86, C85, C87, C88, L43, R87, R4 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V9 and V13. Check components associated with V13.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C59, C61, R69, L41 and other associated components.

SOUND BARS (4.5 MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A8. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check R48, R69, C59, C61, L40 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check C59, C61, L40 and other associated components.

SMEAR

Substitute V7. Check L37, L38, L40, C59, C61, R69 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change or value.	Check C71, C70, C74, C73, C3D, R66, R68, R102, T6 speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A-11 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check M1, M2 and R107. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check M1, M2 and R107. Check B+ filter and decoupling network.

TROUBLE SHOOTING AIDS (cont)

DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V13, V14, V15 and V16. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C96, C6, R97 and other associated components.	Check L43, C93, C90, C91, C92 R93, R86, R94 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V14 and V15. Check M1 and M2. Check R97, R107, C93, and other associated components.

BLOOMING

Check by substitution V14, V15 and V16. Check R97, R107, T3, T5A, M1, M2, C94, C93 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6 and V7. Check video IF components for failure or change of value. Raster, No Sound, No Picture, UHF, substitute V1.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

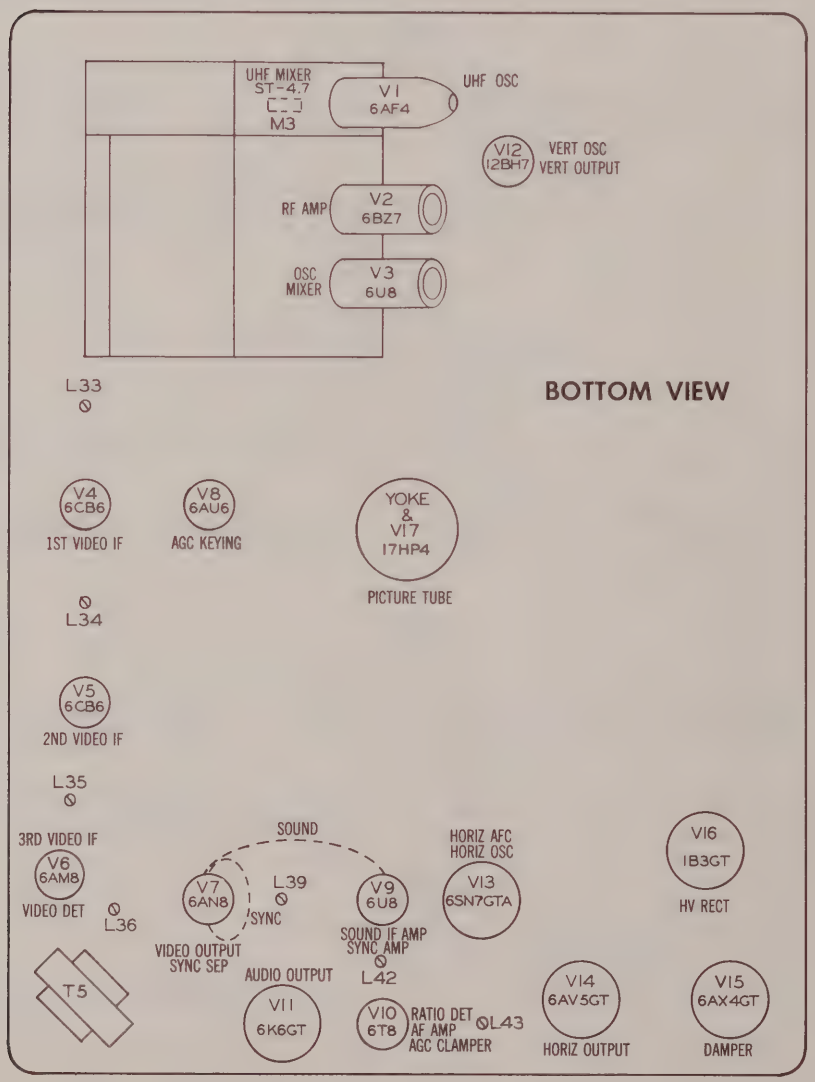
Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	*†14KΩ	10KΩ	.1Ω	0Ω	0Ω	10KΩ	*†14KΩ		
V 2	6BZ7	†650Ω	500KΩ	INF	.1Ω	0Ω	INF	800KΩ	0Ω	0Ω
V 3	6U8	†9.2KΩ	480KΩ	†100KΩ	.1Ω	0Ω	†4.8KΩ	0Ω	0Ω	15KΩ
V 4	6CB6	45KΩ	47Ω	0Ω	.1Ω	†2.4KΩ	†2.4KΩ	0Ω		
V 5	6CB6	40KΩ	56Ω	0Ω	.1Ω	†2.4KΩ	†2.4KΩ	0Ω		
V 6	6AM8	220Ω	.1Ω	†8.3KΩ	.1Ω	0Ω	†8.3KΩ	.1Ω	4.7KΩ	0Ω
V 7	6AN8	†470KΩ	1.8Meg	0Ω	.1Ω	0Ω	†7.4KΩ	†2.3KΩ	1Meg	80Ω
V 8	6AU6	†25KΩ	†650Ω	†650Ω	†650Ω	300KΩ	▲22KΩ	†650Ω		
V 9	6U8	†6.3KΩ	5.5Ω	†4.5KΩ	.1Ω	0Ω	†4.5KΩ	560Ω	2.2KΩ	†470KΩ
V 10	6T8	INF	12KΩ	INF	0Ω	.1Ω	650KΩ	0Ω	4.7Meg	†270KΩ
V 11	6K6GT	NC	0Ω	†1.4KΩ	†1KΩ	470KΩ	TP	.1Ω	330Ω	
V 12	12BH7	▲1.8KΩ	2.2Meg	3KΩ	.1Ω	.1Ω	▲3Meg	1.4Meg	200Ω	0Ω
V 13	6SN7GTA	1Meg	†60KΩ	300KΩ	250KΩ	†39KΩ	0Ω	0Ω	.1Ω	
V 14	6AV5GT	470KΩ	0Ω	TP	NC	▲25Ω	NC	.1Ω	†8.8KΩ	
V 15	6AX4GT	NC	NC	80KΩ	NC	†140Ω	NC	.1Ω	0Ω	
V 16	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲585Ω
V 17	17HP4	0Ω	4.7KΩ	PIN 6 0Ω ▲19Ω	PIN 10	PIN 11 †300KΩ	PIN 12 .1Ω			

*MEASURED IN "UHF" POSITION.
†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V15.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V13) to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C5. Connect the positive lead to chassis. Preset adjustments A2, A5, A6 and A7 maximum counter clockwise from center of coil form.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	44.25MC (Unmod)	Any non-interfering channel	DC probe to point (A). Common to chassis.	A1	Attenuate generator output to maintain not more than -2.5 volts at VTVM. Adjust for maximum deflection.
2.	"	"	44.25MC (Unmod.)	"	"	A2, A3	Detune A3 by turning a few turns counter clockwise. Adjust A2 and A3 for maximum deflection.
3.	"	"	43.2MC	"	"	A4	Adjust for maximum deflection.
4.	"	"	45.3MC	"	"	A5	"
5.	"	"	47.25MC	"	"	A6	Adjust for MINIMUM deflection. Repeat steps 1 thru 5.
6.	"	"	41.25MC	"	"	A7	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Attenuate sweep generator output to maintain 2 volts peak to peak on scope (3 volts on VTVM at point (A). If a separate marker generator is used couple it loosely to sweep output cable near ungrounded convertor tube shield.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to an ungrounded tube shield over converter tube. Low side to chassis.	44.25MC (10MC Swp)	41.25MC 42.75MC 43.8MC 45.0MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig.1. If necessary retouch A1 thru A5 to obtain desired response. A5 affects the high frequency side and position of 45.75MC marker. A4 affects the low frequency side and position of 42.75MC marker. A3 affects position of 45.75MC marker. A1 affects tilt. Increase sweep generator output to observe 41.25MC and 47.25MC traps. If necessary, SLIGHTLY retouch A7 and A8 for correct 41.25MC and 47.25MC trap marker positions (Fig.1).

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.001MFD	High side to point (E). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (B). Common to chassis.	A8, A9, A10	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point (C). Common to point (D).	A-11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.001MFD	High side to point (E). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (B). Low side to chassis.	A8, A9, A10	Disconnect stabilizing capacitor C4. Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
9.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A-11	Reconnect stabilizing capacitor C4. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Replace the convertor tube shield and tune in a TV station and inspect the picture for evidence of 4.5MC beat interference. If necessary, adjust A8 until the horizontal scanning lines are smooth and continuous.

VHF TUNER ALIGNMENT

The VHF tuner has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

UHF TUNER ALIGNMENT

The UHF portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

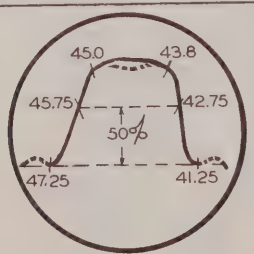


FIG.1

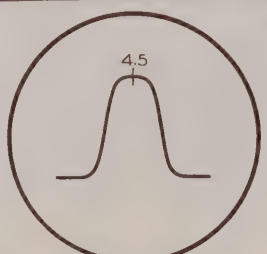


FIG. 2

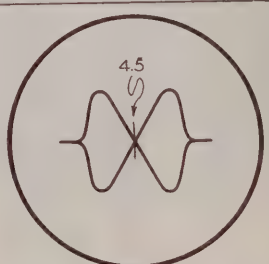
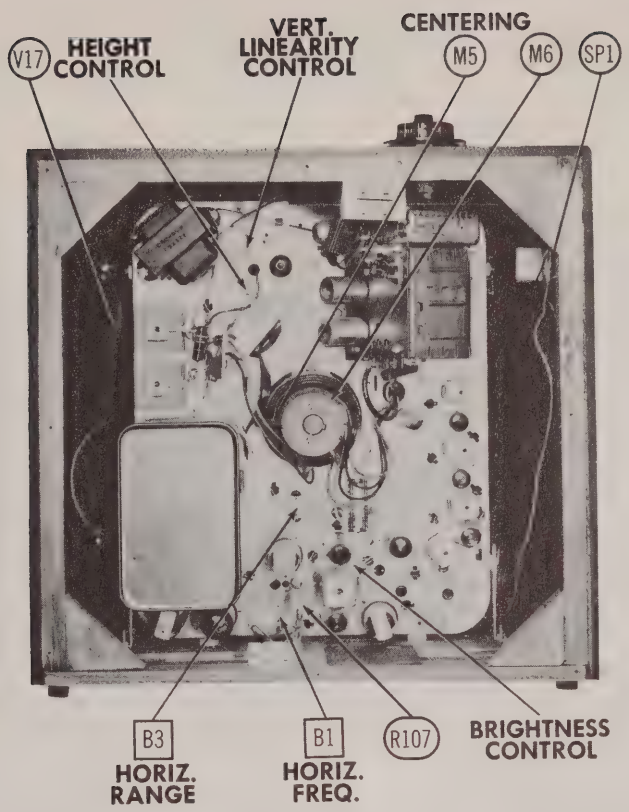


FIG. 3



CABINET—REAR VIEW

L F D
3921 [illegible]
DENVER, COLORADO

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

HORIZONTAL FREQUENCY ADJUSTMENT

1. Turn the horizontal range trimmer (B3) maximum clockwise.

2. If the picture cannot be synchronized with the horizontal hold control, set the control at its mid-range position and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. If the picture will not synchronize, turn the horizontal waveform slug (B2) several turns counter clockwise and readjust B1 until the picture synchronizes.

HORIZONTAL WAVEFORM ADJUSTMENT

Connect the vertical amplifier of oscilloscope through a low capacity probe (see Fig. 5) to terminal "C" of L43. If necessary, adjust B2 for waveform similar to Fig. 4 with broad and narrow peaks of equal height. Keep the picture in sync while making this adjustment with the horizontal hold control or B1. Remove scope.

HORIZONTAL RANGE ADJUSTMENT

1. Turn the horizontal hold control maximum counter clockwise. Switch off channel and back again. If the picture does not lose sync, turn B1 counter clockwise until picture loses sync when switching off channel and back again. Adjust B1 clockwise until picture just pulls into sync.

2. Turn horizontal hold control maximum clockwise. Switch off channel then back again, If the picture does not pull into sync turn the horizontal range trimmer (B3) clockwise until the picture pulls into sync.

3. Due to reaction between B1 and B3 it may be necessary to repeat steps 1 and 2 several times before proper synchronization is obtained. When properly adjusted, the picture should remain in sync at both extreme ends of the horizontal hold control when switching off channel and back again.

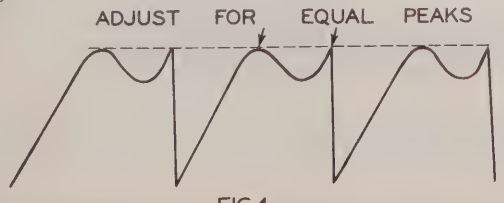


FIG.4

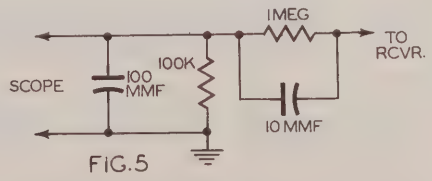
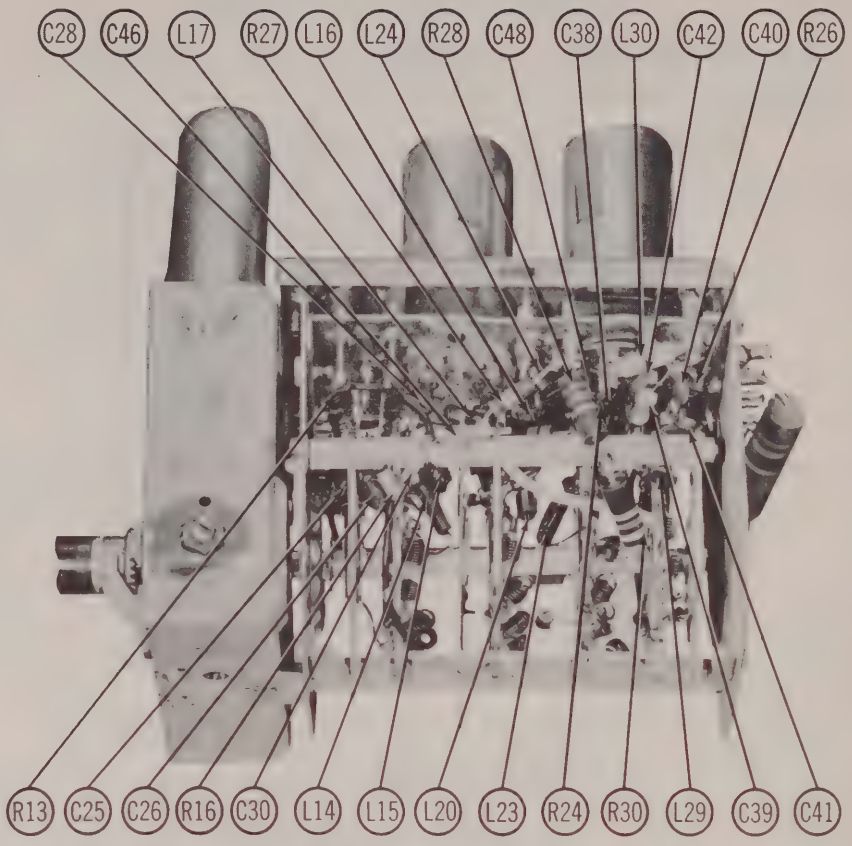
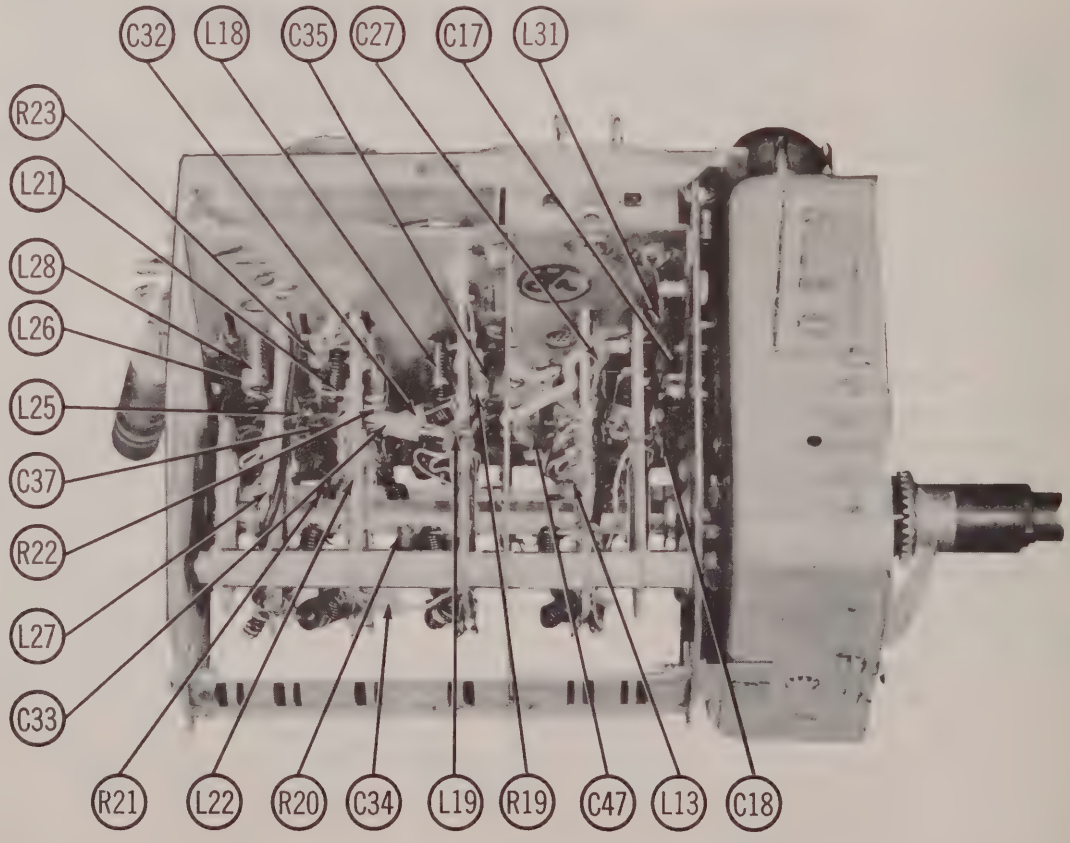


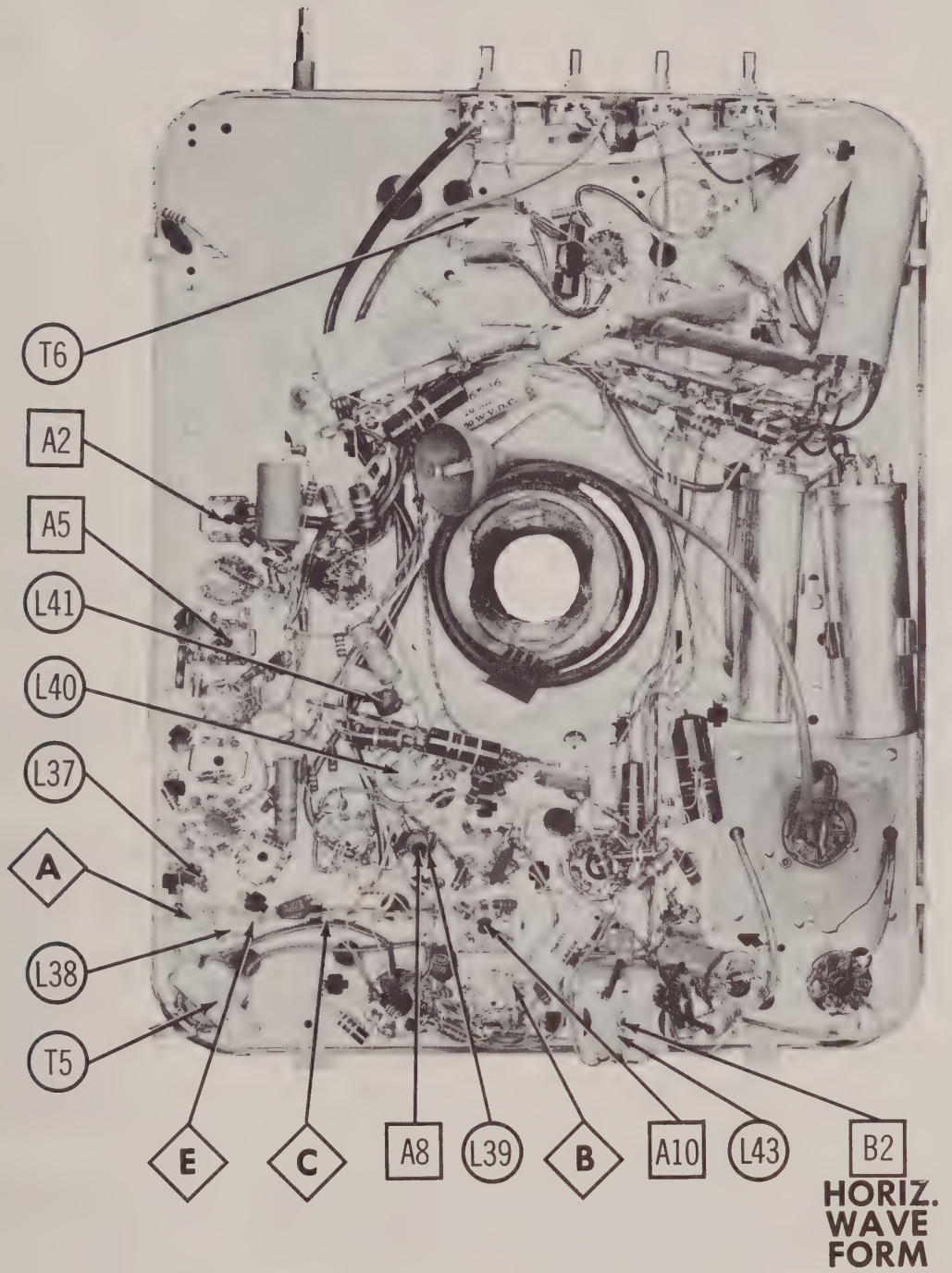
FIG.5



UHF-VHF TUNER-RIGHT SIDE



UHF-VHF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: METEOR PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Osc.	6AF4	6AF4	7DK	
V2	RF Amp.	6BZ7	6BZ7	9AJ	
V3	Mixer-Osc.	6U8	6U8	9AE	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp. - Video Det.	6AM8	6AM8	9CY	
V7	Video Output - Sync Sep.	6AN8	6AN8	9DA	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp. - Sync Amp.	6U8	6U8	9AE	
V10	Ratio Det. - AF Amp. - AGC Clamper	6T8	6T8	9K	
V11	Audio Output	6K5GT	6K5GT	7S	
V13	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V13	Horiz. AFC - Horiz. Osc.	6SN7GTA	6SN7GTA	8BD	6SN7GT used as an alternate.
V14	Horiz. Output	6AV5GT	6AV5GT	6CK	
V15	Damper	6AX4GT	6AX4GT	4CG	
V16	HV Rect.	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: METEOR PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V17	17EP4	17EP4/17RP4	17RP4/17HP4	17EP4/ 17EP4	17HP4/17RP4	12L	① Aluminized
				17HP4B ②		12L	② Silver Screen
	21XP4	21XP4		21XP4		12L	
		21XP4A ①	21XP4A ①	21XP4A ②		12L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: METEOR PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	150	150	T18-323	FP117	TM-150-150	T-050	
C2A	▲150	150	T18-322	FP117	TM-150-150	T-050	
B	▲50	50		TC39	TD-50-50	FM-0550	
C3A	▲200	300	T18-330		TM-4121	D-145	
B	▲20	300				T-100	
C	▲30	300					
D	20	300					
C4	4	50	T18-292	TC30	TD-4-50	MMT-0505	
C5	2	50	T18-323	TC32	TD-2-50	MMT-0505	
C6	10	300	T18-325	TC62	TD-10-450	FM-4510	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: METEOR PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C7	500		T18-304	DD-501	811-501	DC-535	
C8	500			DD-501	811-501	DC-535	
C9	1-4						
C10	170						
C11	170						
C12	1000			MFT-1000			
C13	1000			MFT-1000			
C14	3.3			DD-3R3	NPOA-3R3	ET-5533	
C15	1.1						
C16	1000			DD-103	801-001	DC-521	
C17	6.8			DD-6R8	NPOA-6R8	ET-5568	
C18	1000			DD-103	801-001	DC-521	
C19	500		T18-304	DD-501	811-501	UC-535	
C20	500		T18-304	DD-501	811-501	UC-535	
C21	100			DD-181	NPO-334-151	UC-5315	
C22	5-10						
C23	15						
C24	5-10						
C25	18			D6-180	831-180	UC-5418	
C26	15			DD-150	831-150	UC-5415	
C27	6.8			DD-6R8	NPOA-6R8	ET-5568	
C28	4						
C29	1000			MFT-1000			
C30	2.5						
C31	1000			MFT-1000			
C32	.3						
C33	.56						
C34	.91						
C35	1000			DD-103	801-001	DC-531	
C36	1000			MFT-1000			
C37	15			DD-150	831-150	UC-5415	
C38	1.2						
C39	1.5			TCZ-1R5	NPOA-1R5	ET-5515	
C40	10			DD-100	801-100	UC-541	
C41	10			DD-100	801-100	UC-541	
C42	10000			DD-102	801-001	DC-531	
C43	5						
C44	62			TCZ-62	NPO-337-620		
C45	1000			MFT-1000			
C46	1000			MFT-1000			
C47	1000			DD-103	801-001	DC-531	
C48	1000			DD-102	801-001	DC-521	
C49	1000			MFT-1000			
C50	3	300	T16-267				
C51	100		T15-292				
C52A	1000		T15-286	DD2-102	812-001	DCD-521	
B	1000						

CAPACITORS (cont)

ITEM No.	RATING: CAP.	VOLT.	REPLACEMENT DATA: METEOR PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C53A	1000		T15-286	DD2-102	812-001	DCD-521	
B	1000						
C54A	1000		T15-286	DD2-102	812-001	DCD-521	
B	1000						
C55	1000		T15-247	DD-102	801-001	DC-521	
C56	680		T15-290	DD-681	811-681	UC-5388	
C57A	1000		T15-286	DD2-102	812-001	DCD-521	
B	1000						
C58	10		T15-224	TCN-10	N750A-100	ZT-541	
C59	5000		T15-230	DD-502	811-005	DC-525	
C60	33						Note 1
C61	.047	400	T16-447	DD-503		PT4147	
C62	.022	400	T16-248	DF-203	817-02	PT4122	
C63	82	4000	T15-287				
C64	270		T15-289				
C65	1000		T15-230	DD-102	801-001	DC-521	
C66	33						
C67	5		T15-222	DD-050	831-050	ZT-555	Note 2
C68A	5000		T15-294	DD2-502	811-005	DC-525	
B	5000				811-005	DC-525	
C	5000				811-005	DC-525	
C69	560		T15-303	DD-561	811-561	UC-5356	
C70A	5000		T15-294	DD2-502	811-005	DC-525	
B	5000				811-005	DC-525	
C71	5000		T15-230	DD-502	811-005	DC-525	
C72	5000		T15-230	DD-502	811-005	DC-525	
C73	5000		T15-230	DD-502	811-005	DC-525	
C74	5000		T15-230	DD-502	811-005	DC-525	
C75	.022	400	T16-248	DF-203	817-02	PT4122	
C76	150		T15-295	TCN-150	N750-337-151		
C77A	2000					DC-522	
B	5000		♦T17-109	♦PC-104	♦1405-01	DC-525	
C	5000					DC-525	
C78	.0047	600	T16-233	D6-472	GP2-333-472	PT6247	
C79	.47	600	T16-249			PT6047	
C80	5000		T15-230	DD-502	811-005	DC-525	
C81	.047	400	T16-245	DF-503		PT4147	
C82	.1	400	T16-264	DF-104		PT401	
C83	.047	400	T16-245	DF-503		PT4147	
C84	.047	200	T16-266	DF-503		PT4147	
C85	180	500	T15-300	TCZ-180	NPO-334-181		
C86	3000		T15-228	DD-303	801-003	DC-525	
C87	.047	400	T16-245	DF-503		PT4147	
C88	.022	200	T16-263	DF-203		PT4122	
C89	.22	200	T16-253			PT4022	
C90	390	500	T15-273				
C91	.01	600	T16-262	D6-103	GP2-333-103	PT611	
C92	1000	500	T15-288			MCB255	
C93	.0047	600		D6-472	GP2-333-472	PT6247	
C94	100		T15-222	DD-101	NPO-337-101	UC-531	
C95	47		T15-265	TCZ-47	NPO-338-470	ZT-5447	
C96	.047	400	T16-245	DF-503		PT4147	
C97	56	3000		DD30-560	3KV-560	DC30456	
C98	5000	1000	T15-305	DD-502	811-005	DC-525	
C99	5000	1000	T15-305	DD-502	811-005	DC-525	

Note 1. Some versions use a 56MMF unit in this application.
Note 2. Not used in some versions.
♦ Items C76A, C76B, C76C, R78A, R78B and R78C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: METEOR PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	T24-221	Q13-133	A47-500K-Z	B5K-50-S	U-49	Volume
B	Switch		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWK-12	Not Req.	US-26	Attach to R1A.
R2A	300Ω	½	T25-41	Q11-103	A47-500K-S	AB-2		Contrast
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4		Attach to R2A.
R3A	1.2Meg	½	T25-44	Q11-138	A47-1.5Meg-S	AB-69	U-155	Vertical Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A.
R4A	50KΩ	½	T25-42	Q11-123	A47-50K-S	AB-31	U-36	Horizontal Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A.
R5A	2500Ω	½	T25-45	Q11-113	A47-2500-S	AB-7	SU-8	Vertical Linearity
B	Shaft		Not Req.	Not Req.	FK3-1/4	AK-1	Not Req.	Attach to R5A.
R6A	5Meg	½	T25-43	Q11-141♦	A47-4Meg-S♦	AB-86♦	TA56L♦	Height (Stop at 4Meg)
B	Shaft		Not Req.	Not Req.	FK3-1/4	AK-1	Not Req.	Attach to R6A.
R7A	100KΩ	½	T25-40	Q11-128	A47-100K-S	AB-40	TA1BL	Brightness
B	Shaft		Not Req.	Not Req.	FK3-1/4	AK-1	Not Req.	Attach to R7A.

♦ Connect a 1Meg resistor in series with the right hand terminal of the control, and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: METEOR PART No.	IRC PART No.	NOTES
R8	470KΩ	½	S604740K	BTS-470K	
R9	470KΩ	½	S604740K	BTS-470K	
R10	270Ω	½		BTS-270	
R11	10KΩ	½	S601030K		
R12	1000Ω	½	S601020K	BTS-1000	
R13	56Ω	½		BTS-56	
R14	470KΩ	½	S604740K	BTS-470K	
R15	470KΩ	½	S604740K	BTS-470K	
R16	100KΩ	½	S601040K		
R17	1Meg 5%	½			
R18	750KΩ 5%	½			
R19	470Ω	½		BTS-470	
R20	10KΩ	½	S601030K		
R21	680Ω	½			
R22	470KΩ	½	S604740K		
R23	10KΩ 5%	½	S601030K		
R24	100KΩ	½	S601040K		
R25	470Ω	½	S604720K		

RESISTORS (cont)

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: METEOR PART No.	IRC PART No.	NOTES
R26	15KΩ	½	S601530K		
R27	150KΩ	½			
R28	2200Ω	1		BTA-2200	
R29	100Ω	½		BTS-100	
R30	3900Ω	1			
R31	6800Ω	2	S606822K	BTB-6800	
R32	470KΩ	½	S604740K	BTS-470K	
R33	1000Ω	½	S601020K	BTS-1000	
R34	5600Ω	½	S605620K	BTS-5600	
R35	150Ω	½	S601510K	BTS-150	
R36	47Ω	½	S604700K	BTS-47	
R37	39KΩ	½	S603930K		
R38	1000Ω	½	S601020K	BTS-1000	
R39	18KΩ	½	S601830K		
R40	150Ω	½	S601510K	BTS-150	
R41	56Ω	½	S605600K	BTS-56	
R42	15KΩ	½	S601530K		
R43	82000Ω	2	S608223K	BTB-8200	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: METEOR PART No.	IRC PART No.	NOTES
R77	2200Ω	½	S602230K		
R78A	22KΩ	½			
B	3200Ω	½	♦T17-109		
C	3200Ω	½			
R79	1Meg	½	S601050K		
R80	1Meg	½	S601050K		
R81	2.2Meg	½	S602250K		
R82	1500Ω	½	S601530K		
R83	560Ω	½			
R84	560Ω	½			
R85	820KΩ	½	S608240K		
R86	68KΩ	1	S606831K		
R87	130KΩ	1	S601341K		
R88	8200Ω	½	S606220K		
R89	2.7Meg	1	S602735K		
R90	150KΩ	1	S601541K		
R91	100KΩ	1	S601041K		
R92	150KΩ	1	S601541K		
R93	8200Ω	2	S608220K		
R94	33KΩ	1	S603931K		
R95	150KΩ	1	S601541K		
R96	470KΩ	½	S604740K		
R97	8200Ω	2	S608222K		
R98	100KΩ	½	S601040K		
R99	10KΩ	½	S601030K		
R100	1000Ω	½	S601020K		
R101	2.2Ω	½	T60-272	BW½-2.2	
R102	1000Ω	2	S601022K	BTA-1000	
R103	2300Ω	15	T61-3		
R104	8000Ω	10	T61-4	1 3/4A-8000	
R105	1400Ω 5%	10	T61-2		
R106	470Ω	1	S604711K	BTA-470	
R107	7.5Ω	6	S431007		
R108	470KΩ	½	S604740K	BTS-470K	

♦ Items C76A, C76B, C76C, R78A, R78B, R78C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: METEOR PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	6.3VAC	6.3VAC	80-316						
	②, 54A	②, 3A	②8A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: METEOR PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	T80-317	B6703①,	A-3003 ①	209T1 ①	V405 ①	A-8125①	26A03 ①	A-97X①
T3	Horiz. Output Trans.	T80-320	F3411①*	HVO-40*	230T1 ①*	X080①*	A-8285①*	FLY-34①*	D-19 ①*
T4	Vert. Output Trans.	T80-318	Z1808 ①	A-3039 ①	226T1 ①	V312 ①	A-8141 ①	26S54 ①	A-104X ①
T5A	Yoke Horiz. (24MH)	T10-622	DF8052 ②	MDF-75	222D1 ②	Y70F25	DY-15A②③	Y-10 ②③④	Y-19-1②④
B	Vert. (36MH)			②③	④	②④	④		

① Drill new mounting holes.
② Use original yoke cover & centering device.
③ Connect horizontal damping network across terminals #3 & #7, use original network if necessary.
④ Use original horizontal network if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4	9	4	9	9	9	9	9
3	8	3	8	7 & 8	8	8	7 & 8
2	3	2	3	3	3	3	3
1	1	1	1	1	1	1	1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: METEOR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	5.6KΩ	3.3Ω	80-319	Z1000 ①	A-3026	A-3878①	22S47	S-5X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: METEOR PART No.	OHAM PART No.	NOTES
SP1	4"	PM	3.2Ω	79-429	4A1	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA METEOR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3	Fil. Choke	0Ω						
L4	Fil. Choke	0Ω						
L5	Cathode Choke	0Ω						
L6	RF Choke	0Ω						
L7	UHF IF Coil	0Ω						
L8	VHF Ant. Trans.	.6Ω	.6Ω	5241-501				
L9	VHF Ant. Trans.	.6Ω	.6Ω	5241-501				
L10	IF Trap	.2Ω		1911-11				
L11	FM Trap	0Ω						
L12	IF Trap	.2Ω		1911-11				
L13	VHF Ant. Coils	0Ω						
L14	UHF IF Coils	0Ω						
L15	VHF Ant. Coil	0Ω						Channel 13
L16	Fil. Choke	0Ω		1785-49				
L17	Neut. Coil	0Ω						
L18	VHF RF Coil	0Ω		5265-4				Channel 13
L19	VHF RF Coils	0Ω						
L20	UHF IF Coil	0Ω						
L21	VHF Mixer Grid Coil	0Ω		5265-2				Channel 13
L22	VHF Mixer Grid Coils	0Ω						
L23	UHF IF Coil	0Ω						
L24	Fil. Choke	0Ω		1785-49				
L25	RF Coil	0Ω						
L26	VHF Osc. Coil	0Ω		5265-1				Channel 13
L27	VHF Osc. Coils	0Ω						
L28	VHF Osc. Coils	0Ω						Channel 6
L29	RF Choke	1.6Ω						
L30	RF Coil	0Ω		1894-4				
L31	RF Choke	1.4Ω		1911-10				
L32	Conv. Plate	0Ω		5251-4				
L33	1st. Video IF	.1Ω		T10-680	17-5002 *	TV-127 *	6232 *	Includes 41.25MC trap
L34	2nd. Video IF	.1Ω	.1Ω	T10-677	17-5003	TV-128	6233	Includes 47.25MC trap
L35	3rd. Video IF	.1Ω	.1Ω	T10-678	17-5000	TV-125	6234	
L36	4th. Video IF	.1Ω	.1Ω	T10-679	17-5004	TV-125	6234	
L37	Series Peaking Coil	8Ω		T10-676	19-3125		6153	120 Microhenries
L38	Shunt Peaking Coil	11Ω		T10-590	19-3250	TV-185	6130	269 Microhenries
L39A	4.5MC Trap	5.5Ω		T10-674				
B	Sound IF	5.5Ω						
L40	Series Peaking Coil	5.3Ω		T10-671	19-4250	TV-185 ■	6173	220 Microhenries, wound on 22KΩ resistor
L41	Shunt Peaking Coil	11Ω		T10-590	19-3250	TV-185	6130	260 Microhenries
L42	Ratio Det.	4.4Ω	.3ΩCT	T10-552	17-1033 ▲	TV-110 ▲	1468 ▲	Tertiary winding -.8Ω
L43	Horiz. Osc.	24Ω	55Ω	T10-669	20-1402	TV-162	6183	Waveform winding -57Ω

* Use one winding only.
■ Parallel with 22KΩ resistor.
▲ Drill mounting holes and disconnect capacitor across primary winding.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA METEOR PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.260ADC	83-829	1090A	MR-300	6S300	6Q4	300	
M2	.260ADC	83-829	1090A	MR-300	6S300	6Q4	300	

CRYSTAL DIODES

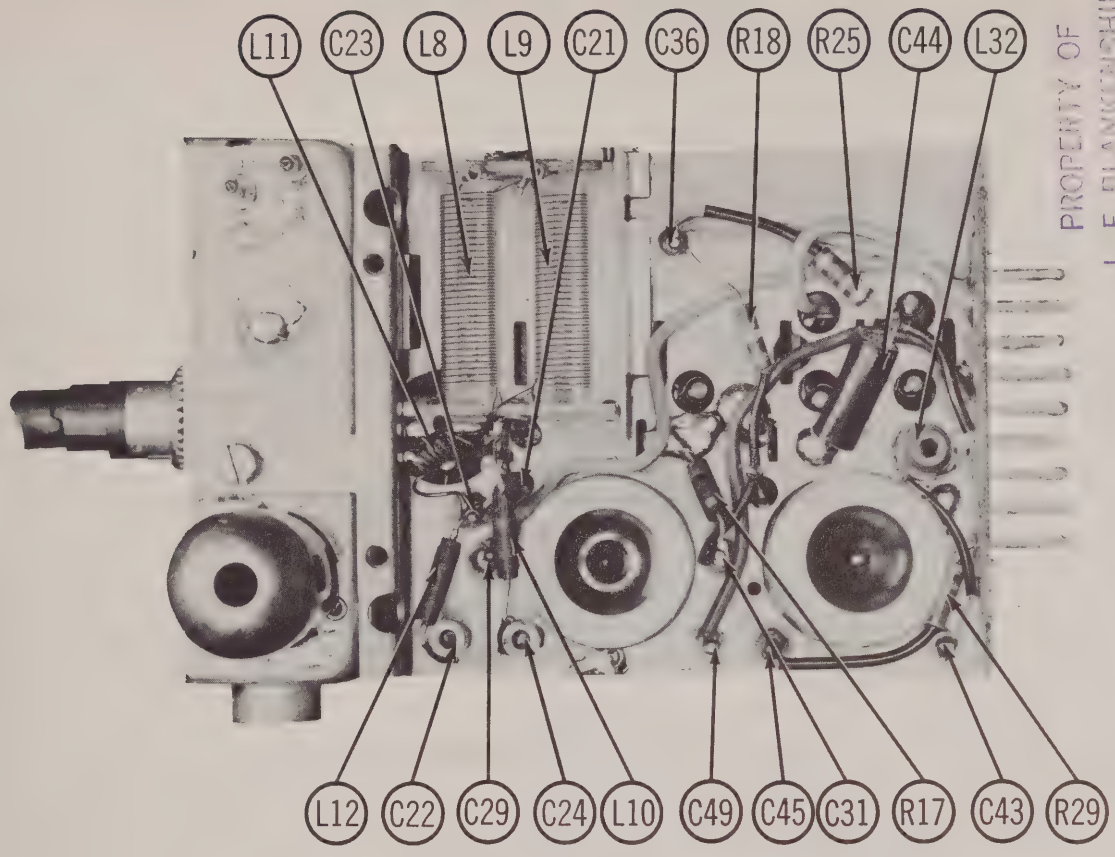
ITEM No.	ORIG. TYPE	REPLACEMENT DATA METEOR PART No.	REPLACEMENT DATA SYLVANIA PART No.	NOTES
M3	ST-47*	T48-99	1N82 or 1N82A	UHF Mixer

* Some version may use crystal diode type 1N82A in this application.

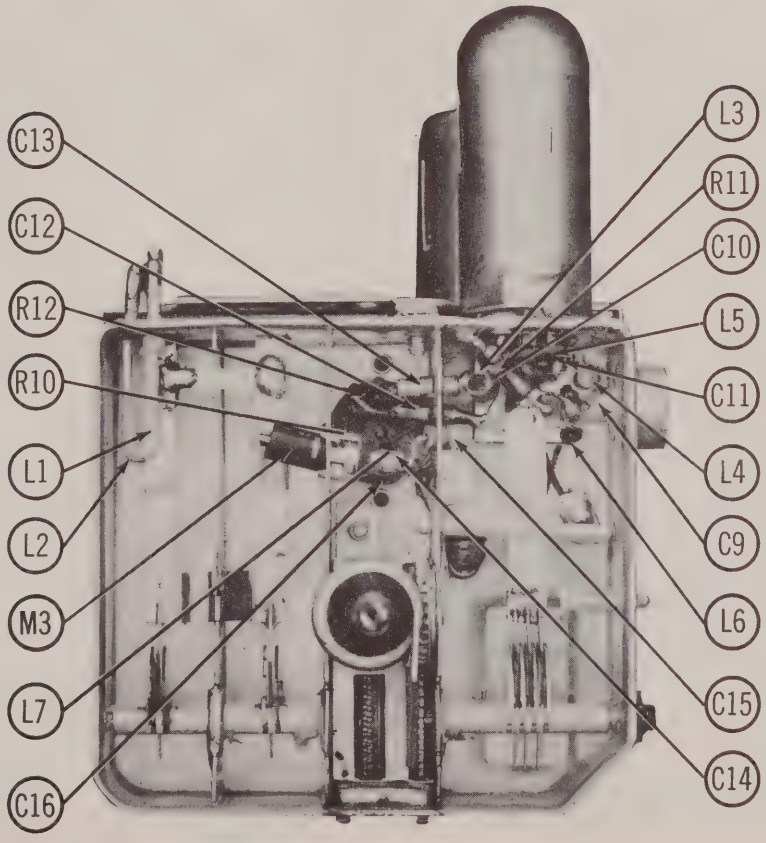
MISCELLANEOUS

ITEM No.	PART NAME	METEOR PART No.	NOTES
M4	Tuner	T95-44	VHF-UHF, Includes VHF tuner section (part #T95-45) and UHF tuner section (part #T95-46)
M5	Centering Device		Part of deflection yoke - rear cover (T4)
M6	Ion Trap	T83-830	
B3	Trimmer Cap.	T20-152	Horiz. Range (25-280MMF)
	Cabinet	T42-733	Model 4104
	Cabinet	T42-734	Model 4121
	Knob	T52-509	UHF channel selector
	Knob	T52-574	VHF channel selector
	Knob	T52-507	VHF fine tuning
	Knob	T52-465	On-off-volume
	Knob	T52-466	Contrast
	Knob	T52-464	Vert. hold
	Knob	T52-467	Horiz. hold
	Disc	T52-510	UHF channel indicator
	Safety Glass	T48-88	Model 4104
	Safety Glass	T48-89	Model 4121
	Mask	T31-287	Model 4104
	Mask	T31-286	Model 4121

PROPERTY OF
L. F. BLANKENSHIP
3924 MONTE ST.
DENVER, COLORADO



VHF-UHF TUNER TOP VIEW



UHF TUNER FRONT VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of VHF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See disassembly instructions).

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug of L43 until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the Ratio Detector Secondary (L42) located on top of chassis. (See tube placement chart).

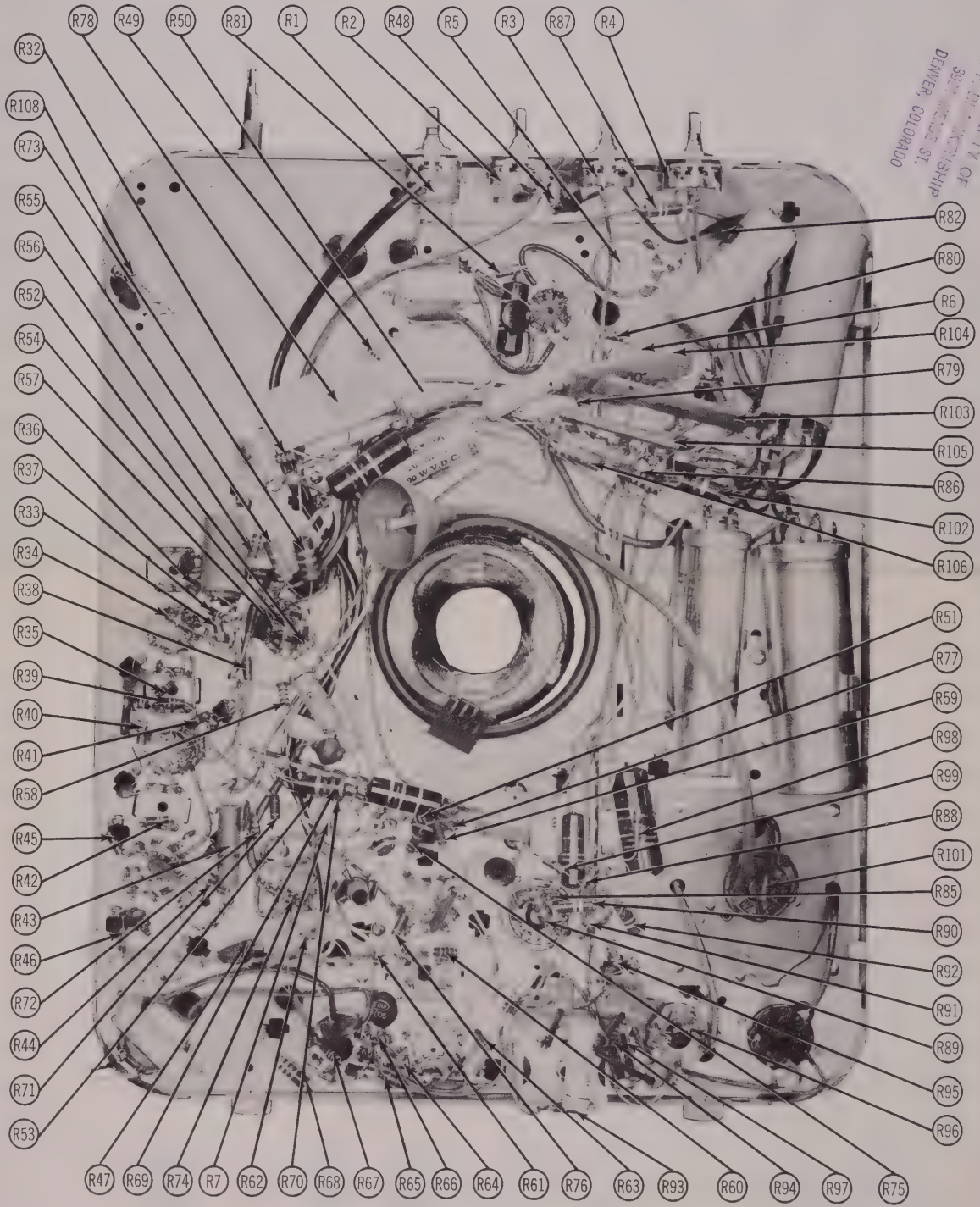
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 7 push-on type controls and UHF dial from top panel of cabinet.
2. Remove 8 wood screws. Remove rear cover.
3. Unsolder 2 speaker leads.
4. Remove 2 wood screws. Remove antenna terminal bracket.
5. Remove 2 wood screws from 2 braces at the bottom rear of cabinet.
6. Remove 4 screws from cabinet feet and 2 wood screws from the sides and front of mounting board bottom.
7. Lift cabinet up and off of mounting board.
8. Remove 2 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PRESIDENT OF
U.S. NAVY SHIP
DENVER COLORADO

PHOTOFACT* Folder

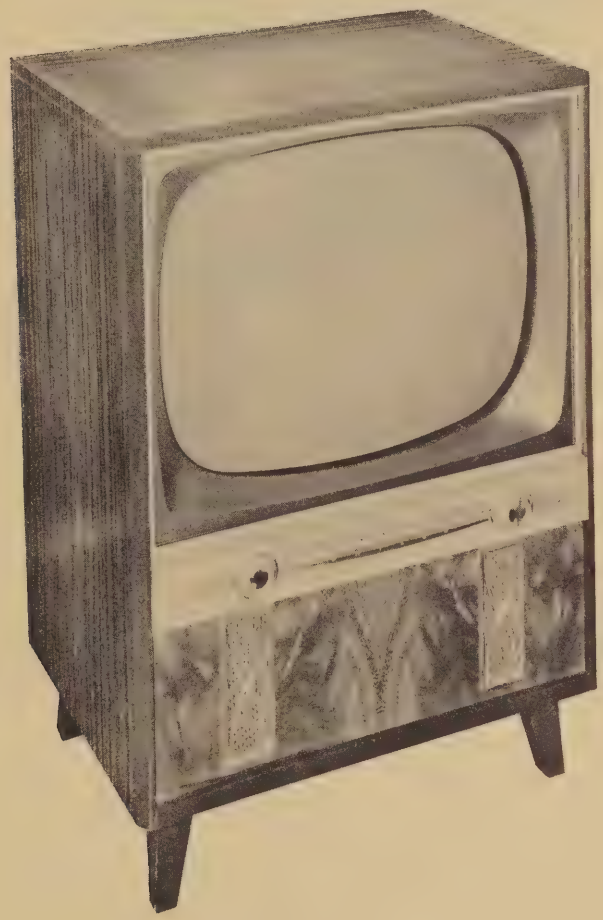
*TRADE MARK

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 24C6110

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

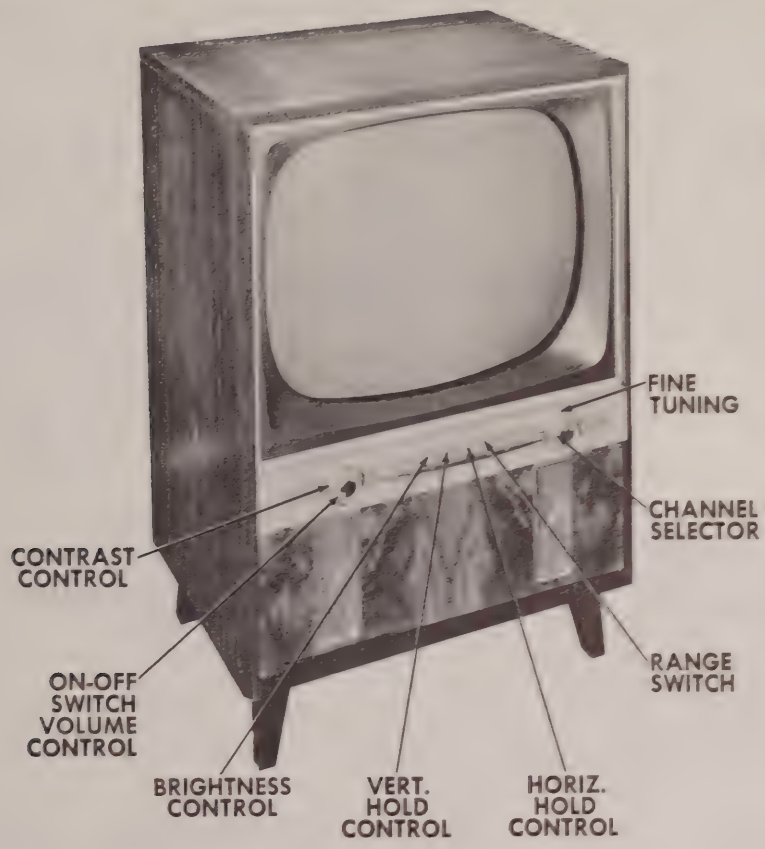
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana.

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 11–55 SET 298 FOLDER 8

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

PROPERTY OF



PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

PHILCO MODEL 24C6110

TRADE NAME	Philco Models 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV 354)
MANUFACTURER	Philco Corp., Tioga & "C" Streets, Philadelphia, Pa.
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.9 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

INDEX

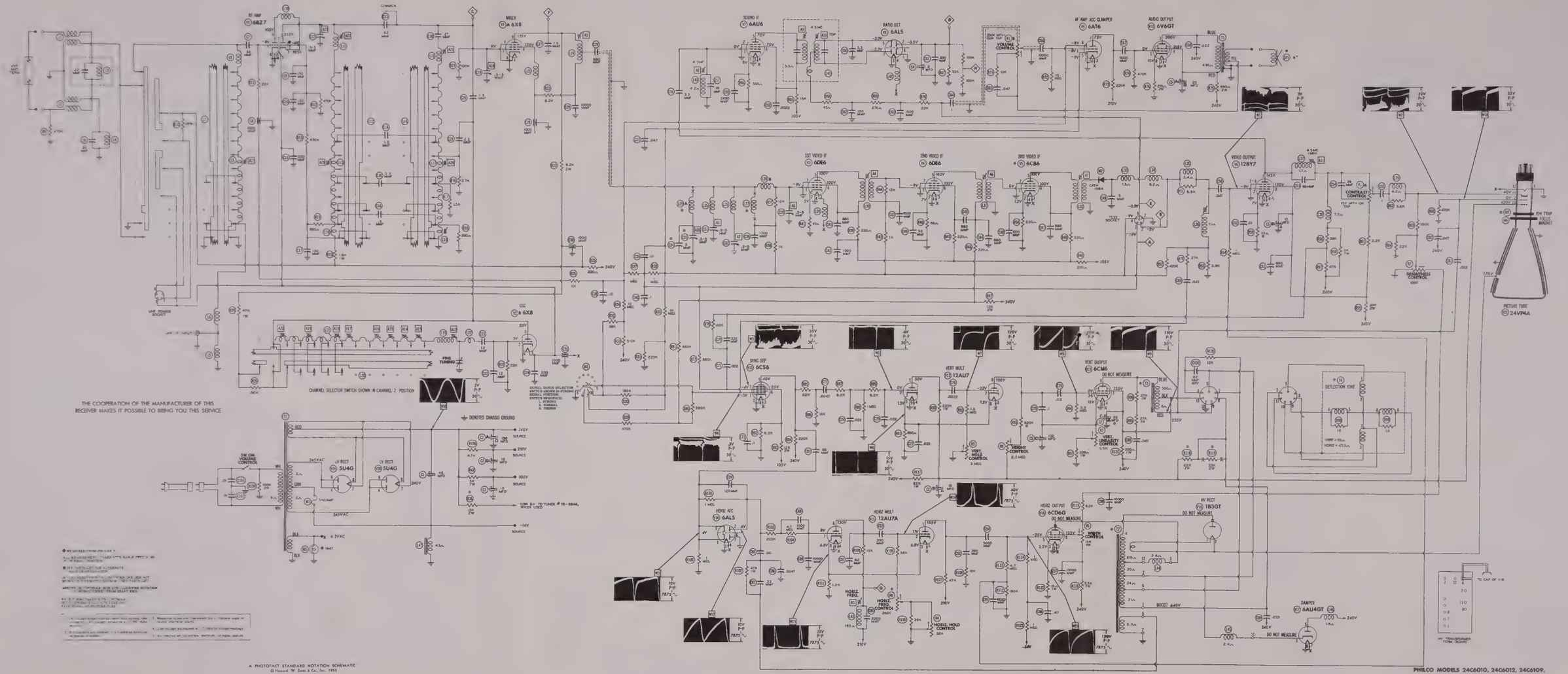
Alignment Instructions 6, 7
Drive Cord Stringing 16
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 13 thru 16
Photographs
- Cabinet-Rear View 11
- Capacitor Identification 4, 9
- Chassis-Top View 3
- RF Tuner 10

Photographs (Cont)
- Resistor, Identification 19, 20
- Trans., Inductor & Alignment Identification 17

Resistance Measurements 8
Servicing in the Field 16
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

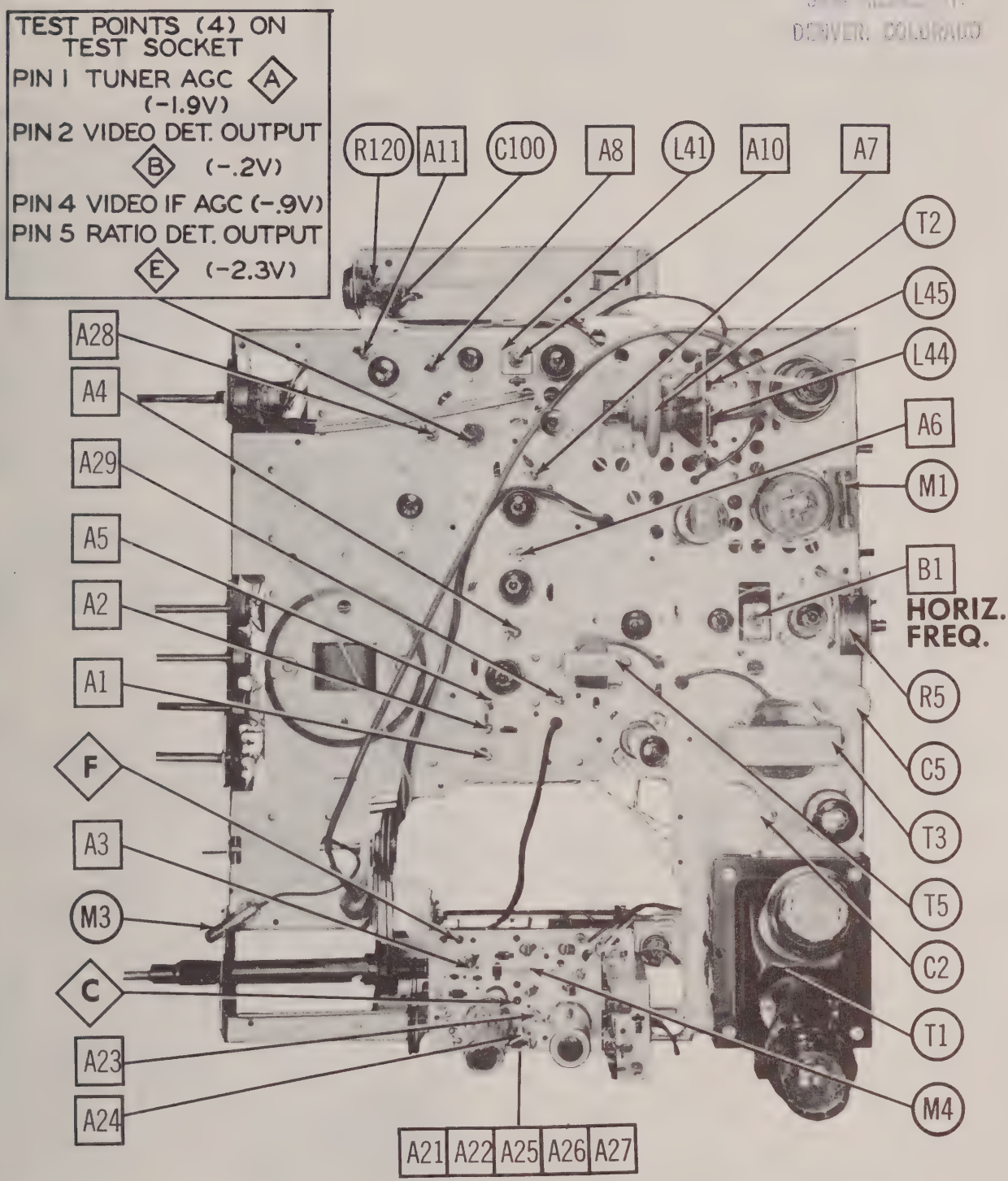
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1953
PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

PROPERTY OF
L. F. DEAN SERVICE
3M AGENCY
DENVER, COLORADO



CHASSIS TOP VIEW

SET 298 FOLDER 8

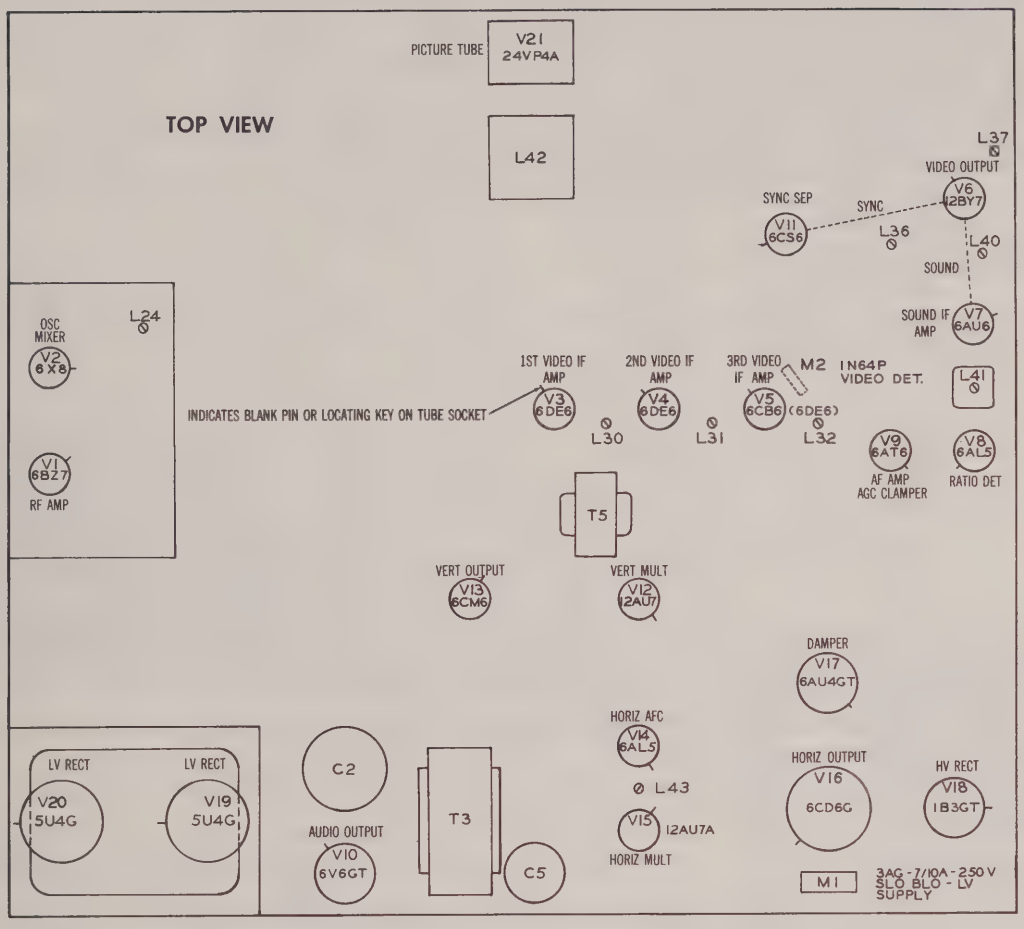
PROPERTY OF
E. F. [illegible]SHIP
3511 MAPLE ST.
[illegible] COLORADO

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3025 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound -V19, V20, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster -V2, V3, V4, V5
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V21
Has pic, no sound -V7, V8, V9, V10
Overloaded picture -V9

SYNC FAILURE
No vert. sync - V11, V12
No horiz. sync -V11, V14, V15
No vert. or horiz. sync -V11

SWEEP FAILURE
No raster, has sound -V15, V16, V17, V18, V21
No vertical deflection -V12, V13
Poor vert. linearity or foldover -V12, V13
Poor horiz. linearity or foldover -V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19, V20
Vert. off freq. -V11, V12
Horiz. off freq. - V11, V14, V15

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Allow 15 minutes for receiver and test equipment to warm up. There should be a good bond between chassis and test equipment.
Connect the deflection yoke and speaker during alignment.
Do not remove the horizontal oscillator tube (V15) to disable the high voltage. The high voltage lead should be securely taped and kept away from the chassis. The IF shield must be in place.

VIDEO IF ALIGNMENT

Set the contrast and brightness control fully counter clockwise.
Connect the negative lead of a 14 volt bias supply thru 10KΩ to point Ⓐ. Connect the positive lead to chassis.
Set the channel selector to channel 4 position.
Attenuate generator during alignment for 4 volts peak to peak at point Ⓑ.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side of marker generator to point Ⓒ. Low side to chassis.	Not used.	47.25MC (400∿ 20% Mod.)	4	Vert. Amp. thru 15KΩ to point Ⓑ. Low side to chassis.	A1	Adjust for MINIMUM 400∿ indication on scope.
2.	"	"	"	41.25MC	"	"	A2	"
3.	"	"	"	45.4MC	"	"	A3, A4	Adjust for maximum 400∿ indication on scope.
4.	"	"	"	43.0MC	"	"	A5	"
5.	"	"	"	42.7MC	"	"	A6	"
6.	"	"	"	44.4MC	"	"	A7	"
7.	Fig. 1	Across antenna input terminals thru matching network (Fig. 1).	69MC (6MC Swp.)	67.25MC 70.25MC	"	"		Set fine tuning control at its mid-range position. Check response curve similar to Fig. 2 for curve limits. If necessary, readjust A3 thru A7 for response curve limits as in Fig. 2. Adjust A3 and A4 for proper curve level. Adjust A7 to level curve top. Adjust A6 for proper slope of curve on low frequency side. Readjust adjustments only SLIGHTLY. If unable to obtain proper response curve, repeat steps 3 thru 7. Do not reset A1 or A2. Increase sweep generator output to observe 41.25MC trap. Adjust A29 for MINIMUM pop-up of 41.25MC trap.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓓ to chassis. The junction of these two resistors is alignment point Ⓗ as shown on the schematic.
Remove 6DE6 (V3, 1st Video IF Tube) from its socket, set the volume control for normal volume.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	2200Ω Carbon Resistors	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point Ⓓ. Common to chassis.	A8, A9	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point Ⓔ. Common to point H.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V3 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6DE6 (V3, 1st Video IF Tube) from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	2200Ω Carbon Resistors	High side to point Ⓑ. Low side to chassis.	4.5MC (450KC Swp.)	4.5MC	Any	Vert. Amp. to point Ⓓ. Low side to chassis.	A8, A9	Disconnect stabilizing capacitor C4. Increase generator output for reading on scope. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
9.	"	"	"		"	Vert. Amp. to point Ⓔ. Low side to chassis.	A10	Reconnect stabilizing capacitor C4. Increase generator output for reading on scope. Adjust so that 4.5MC occurs at crossover lines as shown in Fig. 4. SLIGHTLY readjust A9 for maximum amplitude and straightness of crossover lines. Replace V3 in its socket.

4.5MC TRAP ALIGNMENT

Set contrast control at maximum position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	2200Ω Carbon Resistors	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to pin 11 (cathode) of picture tube Common to chassis.	All	Remove V3 from its socket. Adjust for MINIMUM deflection. Replace V3 in its socket.

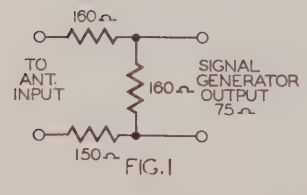


FIG. 1

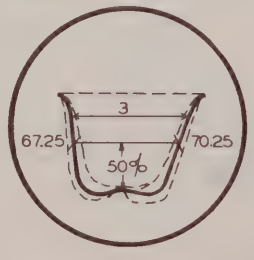


FIG. 2

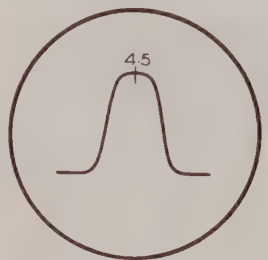


FIG. 3

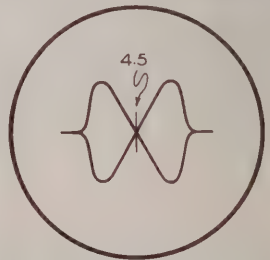


FIG. 4

PROPERTY OF
[illegible] OWNERSHIP
[illegible] MEADE ST
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

ALTERNATE 4.5MC TRAP ADJUSTMENT

Tune in a TV station and turn the fine tuning control clockwise until a 4.5MC beat pattern appears in the picture. Adjust A-11 for minimum 4.5MC beat in the picture.

OSCILLATOR ALIGNMENT

Disconnect white wire going to tuner AGC from main chassis. Connect the negative lead of a 1.5 volt battery to loose end on tuner. Connect positive lead to tuner chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	Not used	257MC	13	Vert. Amp. thru 1KΩ to point Ⓒ. Low side to chassis.	A12	Adjust for zero beat on scope. If regeneration occurs, increase bias to 3 volts if necessary.
				251MC	12		A13	
				245MC	11		A14	
				239MC	10		A15	
12.	"	"	"	233MC	9	"	A16	Adjust A16 for channel 9 frequency. Then check A16 for channel 8 frequency. Recheck A16 for channel 9. If necessary, make compromise adjustment between channel 8 and 9 for zero beat on scope.
				227MC	8			
13.	"	"	"	221MC	7	"	A17	Adjust A17 for zero beat on scope. Recheck steps 11, 12 and 13. If necessary, readjust until channels are within 500KC of their proper frequencies.
14.	"	"	"	129MC	6	"	A18	Adjust for zero beat on scope.
15.	"	"	"	113MC	4	"	A19	"
16.	"	"	"	101MC	2	"	A20	"

RF AND MIXER ALIGNMENT

Connect bias as in "Oscillator Alignment". Disconnect tuner coupling link at the IF terminal strip near V3 and solder a 68Ω resistor to the open end of the lead from the tuner. Remove V3 from its socket. Adjust scope controls so that the width is double the height.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Fig. 1	Across antenna terminals thru antenna matching network (Fig. 1).	213MC (10MC Swp.)	213MC	13	Vert. Amp. thru 1KΩ to point Ⓕ. Low side to tuner chassis.	A21 A22	Check for response similar to Fig. 5. If response is not flat between limits shown, detune A22 counter clockwise until single peak appears. Adjust A21 until peak falls on 213MC marker. Adjust A22 for response similar to Fig. 5.
18.	"	"	177MC (10MC Swp.)	177MC	7	"	A23 A24	Check for response indicated by dotted lines in Fig. 6 A and 6B. If necessary, adjust mirror image of original response curve (tilt in opposite direction). If response curve appears as in Fig. 6A, adjust A23 and A24 until curve appears as in Fig. 6B. This adjustment over compensates to allow for channel 13 adjustment. Repeat step's 17 and 18 until centered and symmetrical response curves are obtained on channels 7 and 13.
19.	"	"	85MC (10MC Swp.)	85MC	6	"	A25 A26 A27	Adjust for symmetrical response approximately center of bandpass. Adjust A26 counter clockwise until signal peak appears. Adjust A25 until peak falls on 85MC marker. Adjust A27 for maximum curve amplitude and symmetry of single peak. Retouch SLIGHTLY if necessary, A25 and A26 for symmetrical response centered at approximately the 85MC marker point similar to Fig. 5.
20.	"	"	44MC (10MC Swp.)	44MC	UHF Position	"	A25 A26 A27	Check response curve for symmetrical response centered at approximately, 44MC. If necessary, retouch SLIGHTLY A25, A26 and A27 for symmetrical response centered at approximately the 44MC marker point. Repeat step 19 to be sure channel 6(85MC) is within proper limits on response curve similar to Fig. 5. Remove 68Ω resistor and reconnect IF coupling link. Remove bias supply and reconnect AGC lead to tuner terminal.

VIDEO PEAKING COIL ADJUSTMENT

In cases of excessive overshooting or smear on some stations, it may be necessary to adjust A28. Alignment of the tuner and IF portions of the receiver must be correct before this adjustment is made. Proper adjustment of A28 is the point of minimum smear and trailing whites. After adjusting A28 on one channel, check others to make certain picture quality has not been affected.

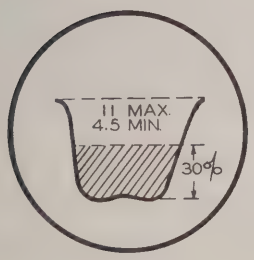


FIG.5

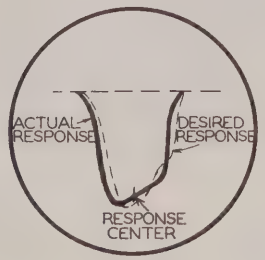


FIG.6A

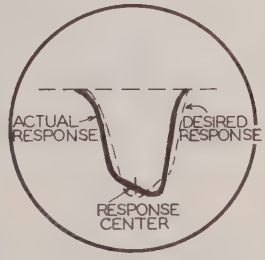
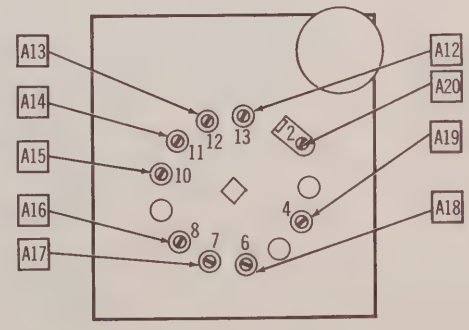


FIG.6B

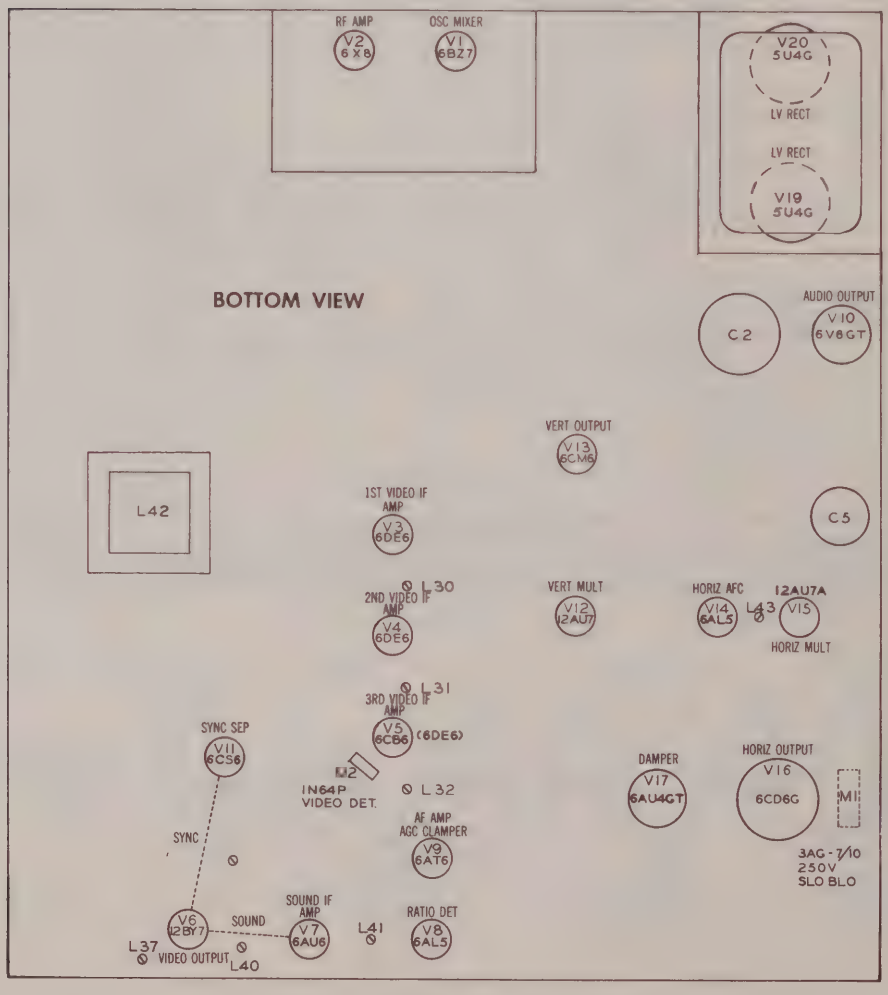


PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

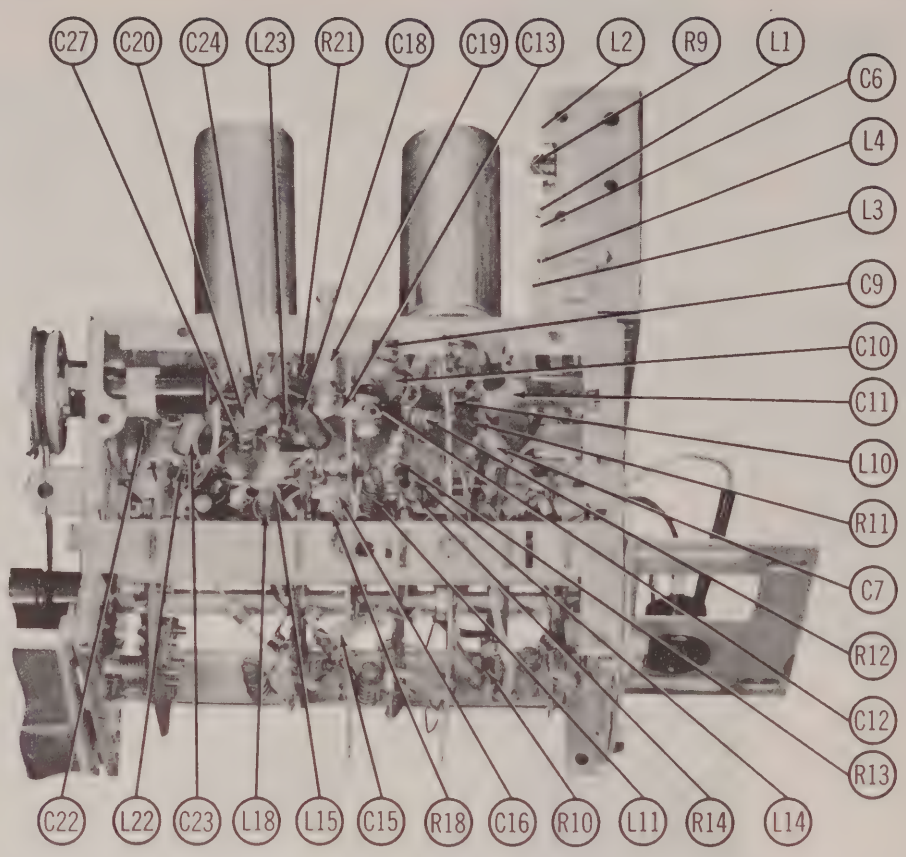
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†2KΩ	250KΩ	INF	0Ω	.1Ω	INF	2Meg	0Ω	0Ω
V 2	6X8	0Ω	22KΩ	†47KΩ	0Ω	.1Ω	0Ω	100KΩ	†17KΩ	†8.5KΩ
V 3	6DE6	470KΩ	47Ω	.1Ω	0Ω	†5KΩ	†5KΩ	0Ω		
V 4	6DE6	470KΩ	68Ω	.1Ω	0Ω	†12KΩ	†5KΩ	0Ω		
V 5	6CB6	.1Ω	220Ω	.1Ω	0Ω	†5KΩ	†5KΩ	0Ω		
V 6	12BY7	33Ω	1.2Meg	0Ω	.1Ω	.1Ω	0Ω	†4.5KΩ	†15KΩ	0Ω
V 7	6AU6	4.2Ω	0Ω	0Ω	.1Ω	†20KΩ	†20KΩ	330Ω		
V 8	6AL5	0Ω	33KΩ	0Ω	.1Ω	INF	NC	INF		
V 9	6AT6	10Meg	0Ω	.1Ω	0Ω	470KΩ	2Meg	†225KΩ		
V 10	6V6GT	NC	.1Ω	†1.2KΩ	†680Ω	470KΩ	TP	0Ω	270Ω	
V 11	6CS6	1.2Meg	0Ω	.1Ω	0Ω	†50KΩ	†14KΩ	2Meg		
V 12	12AU7	▲300KΩ	1Meg	680Ω	.1Ω	.1Ω	▲1.7Meg	3.2Meg	680Ω	0Ω
V 13	6CM6	†330Ω	NC	3.3Meg	.1Ω	0Ω	3.3Meg	550Ω	NC	†680Ω
V 14	6AL5	1Meg	2Meg	0Ω	.1Ω	1Meg	NC	0Ω		
V 15	12AU7A	†50KΩ	110KΩ	1.2KΩ	.1Ω	.1Ω	†20KΩ	7Meg	1.2KΩ	0Ω
V 16	6CD6G	NC	0Ω	18Ω	TP	1.5Meg	TP	.1Ω	†6.5KΩ	TOP CAP ▲25Ω
V 17	6AU4GT	NC	NC	160KΩ	NC	†1.9Ω	NC	.1Ω	0Ω	
V 18	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲700Ω
V 19	5U4G	INF	20KΩ	INF	55Ω	INF	55Ω	INF	20KΩ	
V 20	5U4G	INF	20KΩ	INF	55Ω	INF	55Ω	INF	20KΩ	
V 21	24VP4A	0Ω	470KΩ	PIN 10 ▲55KΩ	PIN 11 †180KΩ	PIN 12 .1Ω				

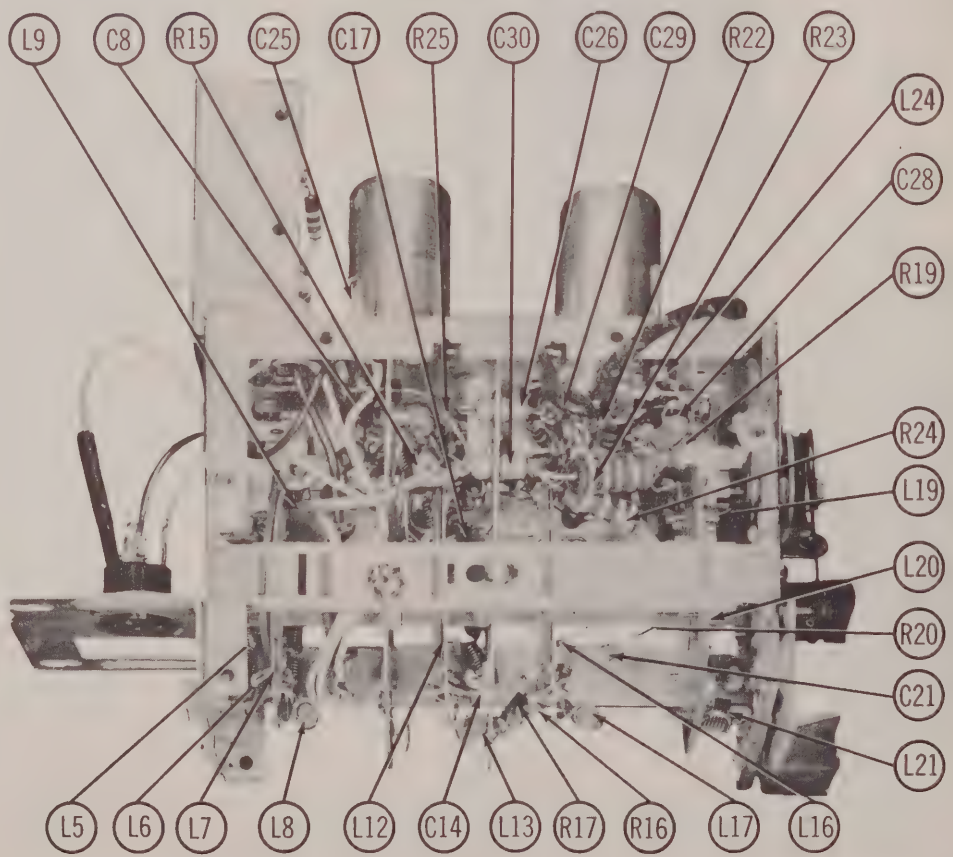
†MEASURED FROM PIN 2 OF V19.
▲MEASURED FROM PIN 3 OF V17.
NC-NO CONNECTION.
TP-TIE POINT.
ALL MEASUREMENTS TAKEN WITH RANGE SWITCH (M5) IN "NORMAL" POSITION.



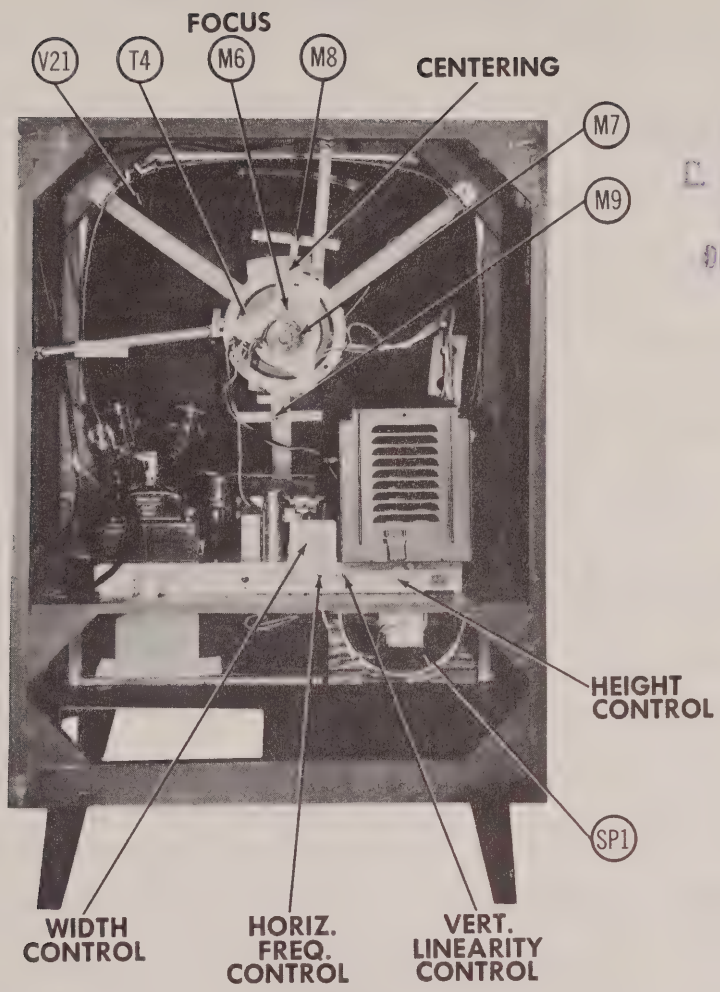
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Tune in a TV station, preferably a test pattern. Reduce the picture width until approximately one inch of blank screen appears on each side of the picture.

Increase the brightness control setting until the blanking becomes visible as indicated by a dark bar at each side of the picture. Connect a .1MFD capacitor from point Ⓖ to chassis.

Set the horizontal hold control at the center of its range.

Adjust the horizontal frequency control (R6) until the picture is centered between the two blanking bars.

Remove the .1MFD capacitor.

Adjust the horizontal frequency coil slug (B1) until the picture is again centered between the two blanking bars.

Rotate the horizontal hold control slowly thru its range. The picture should lose sync at both extremes of rotation. If it does not, readjust the horizontally frequency control until that condition is obtained. Check the number of diagonal bars on either side of the pull-in range of the horizontal hold. There should be 1 or 2 bars present. If proper pull-in is not obtained, repeat the above procedure.

Adjust the horizontal width control for a picture slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17, V19 and V20. Check C93, C94, R116, R5, T2, T4A and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check C93, C94, R116, T2, T4A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C89 for open. Check L43, C88, R104, R105, R4, R6 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T2 and T4 for internal arcing. Check L43, C85, C86, C87, C90, R106 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R121, C2C, R97 and other associated components.	Check R90, R91, R92, R93, R118, C76, C79 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check R93, T3 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R90, R93, R118, C76, C79 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check R97, R7, C5C, T3, T4B and other associated components.

FOLDS

Check by substitution V12 and V13. Check C76, C78, C79, R97, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V11. Check C69, C70, C71, R84, R83 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check vertical integrator network. Check C76, C77, R92, R90, and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V14 and V15. Check C83, C84, C88, C89, C90, L43 and other associated components.

HORIZONTAL BENDING

Check by substitution V11, V14 and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check C50, C51, C55, C5B, R55, R56, R57, R58, R59, L38 and other associated components.

SOUND BARS (4.5 MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A-11. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check C50, C55, R55, R56, R57, R58, R59, R62, L39, L35 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check C50, C55, L35, L39 and other associated components.

SMEAR

Substitute V6. Check C50, C55, L33, L34, L35, L36, L39, R58 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8, V9 and V10. Check stages V9 and V10 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C64, C66, C67, C68, C5A, R73, R75, R76, T5, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A10 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or no Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check by substitution V19 and V20. Check fuse, M1. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check by substitution V19 and V20. Check B+ filter and decoupling network.

PROPERTY OF
L. F. BLANKENSHIP
3021 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Osc.-Mixer	6X8	6X8	9AK	
V3	1st. Video IF Amp.	6DE6	6DE6	7CM	
V4	2nd. Video IF Amp.	6DE6	6DE6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	6DE6 used as an alternate
V6	Video Output	12BY7	12BY7	9BF	
V7	Sound IF Amp.	6AU6	6AU6	7BK	
V8	Ratio Det.	6AL5	6AL5	6BT	
V9	AF Amp.- AGC Clamper	6AT6	6AT6	7BT	
V10	Audio Output	6V6GT	6V6GT	7AC	
V11	Sync Separator	6CS6	6CS6	7CH	
V12	Vert. Mult.	12AU7	12AU7	9A	
V13	Vert. Output	6CM6	6CM6	9CK	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Mult.	12AU7A	12AU7A	9A	
V16	Horiz. Output	6CD6G	6CD6G	5BT	
V17	Damper	6AU4GT	6AU4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	
V20	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: PHILCO PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V21	24VP4A ①	24VP4A ①		24VP4A ② 24VP4	24VP4A ①	12N 12N	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PHILCO PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	40	400	30-2568-62	FP146	TM-40-400	S-270	
C2A	■130	350	30-2584-49		TM-4122	Q-070	
B	▲10	475				S-230	
C	▲20	350					Note 1
D	10	350					
C3	10	350	30-2417-35	TC62	TD-12-350	FM-3512	
C4	2	50	45-3035-4	TC302	TD-2-50	MMT-0505	
C5A	■20	350	30-2584-43	FP231.3	TM-2010-450	D-210	
B	▲10	350		TC3501	TD-100-50	MTH-5010	
C	100	50					

Note 1. When C2C is 10MFD, Mfgr. part number is 30-2584-42.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PHILCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C6	20			D6-200	GP1K-200	UC-542	
C7	33			D6-330	GP1K-330	UC-5433	
C8	1000						
C9	150			D6-151	GP2K-151	UC-5315	
C10	150			D6-151	GP2K-151	UC-5315	
C11	220			D6-221	GP2K-221	UC-5322	
C12	.5-3			829-3	3115-01-0R5	CT565A	
C13	.62						
C14	1.2						
C15	3.3			TCZ-3R3	NP0A-3R3	ZT-5533	
C16	15			D6-150	GP1K-150	UC-5415	
C17	150			DD-151	811-151	UC-5315	
C18	27			TCZ-27	NP0L-270		
C19	.5-3			829-3	3115-01-0R5	CT565A	
C20	1.5						
C21	2.2						
C22	12						
C23	12						
C24	220			D6-221	GP2K-221	UC-5322	
C25	1000						
C26	1000						
C27	7.5						
C28	680			D6-681	GP2K-681	UC-5368	
C29	10000			DD-103	811-01	DC-511	
C30	1000						
C31	.5-5		31-6520-9		532-08-0R5		
C32	.5-5		31-6520-9		532-08-0R5		
C33	.5-5		31-6520-9		532-08-0R5		Note 2
C34	5			DD-050	831-050	ZT-555	Note 2
C35	.5-5		31-6520-9		532-08-0R5		
C36	1500		30-1238-15	DD-152	801-0015	DC-5215	
C37	.047	200	30-4650-45	DF-503		PT4147	
C38	.15	200	30-4650-48			PT4015	
C39	.01	200		D6-103	GP2-333-103	PT411	
C40	.1	200	30-4750-47	DF-104		PT401	
C41	680		62-168001011	D6-681	GP2K-681	UC-5368	
C42	1500		30-1238-15	DD-152	801-0015	DC-5215	
C43	1500		30-1238-15	DD-152	801-0015	DC-5215	
C44	680		62-168001011	D6-681	GP2K-681	UC-5368	
C45	680		62-168001011	D6-681	GP2K-681	UC-5368	
C46	33		62-033009001	D6-330	GP1K-330	UC-5433	
C47	680		62-168001011	D6-681	GP2K-681	UC-5368	
C48	1500		30-1238-15	DD-152	801-0015	DC-5215	
C49	5		30-1224-28	DD-050	831-050	ZT-555	
C50	.047	200	30-4650-45	DF-503		PT4147	
C51	680		62-168001011	D6-681	GP2K-681	UC-5368	
C52	.01	100	30-4650-41	D6-103	GP2-333-103	PT411	
C53	68		62-068409011	D6-680	801-680	UC-5468	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C54	39	500	62-03940911	D6-390	831-390	UC-5439	
C55	.1	400	30-4650-47	DF-104		PT401	
C56	3.3		30-1221-9	TCZ-3R3	NP0A-3R3	ZT-5533	
C57	18		62-01830001	D6-180	831-180	ZT-5423	
C58	.0022	400	30-4650-54	D6-222	GP2-333-222	PT6222	
C59	5000		30-1238-1	DD-502	811-005	DC-525	
C60	3.3		30-1221-9	TCZ-3R3	NP0A-3R3	ZT-5533	
C61	330		62-13901001	D6-331	GP2K-331	ZC-5333	
C62	150		62-11500001	D6-151	GP2K-151	UC-5315	
C63	1500		30-1238-15	DD-152	801-0015	DC-5215	
C64	.1	200		DF-104		PT401	
C65	.047	200		DF-503		PT4147	
C66	10000		30-1238-3	DD-103	811-01	DC-511	
C67	5000		30-1238-1	DD-502	811-006	DC-525	
C68	.022	600	30-4650-50	DF-303	817-03	PT6122	
C69	.047	200	30-4650-45	DF-503		PT4147	
C70	330		62-13901001	D6-331	GP2K-331	UC-5333	
C71	.022	400	30-4650-43	DF-303	817-03	PT4122	
C72	.1	200	30-4650-47	DF-104		PT401	
C73	.0047	200	30-4650-58	D6-472	GP2-333-472	PT6347	
C74	.022	200	30-4650-43	DF-303	817-03	PT4122	
C75	.022	200	30-4650-43	DF-303	817-03	PT4122	
C76	.0022	400	30-4650-54			MCB460	
C77	.033	200		DF-303		PT6133	
C78	.1	400	30-4650-47	DF-104		PT401	
C79	.22	400	30-4650-49			PT4022	
C80	.047	400	30-4650-45	DF-503		PT6147	
C81	.022	400	30-4650-43	DF-303	817-03	PT4122	
C82	.047	400	30-4650-45	DF-503		PT4147	
C83	68		62-06840911	D6-680	801-680		
C84	120	500	60-01025337	D6-121	811-121		
C85	.001	400	30-4650-52	D6-102	GP2L-102	PT621	
C86	.0047	200	30-4650-58	D6-472	GP2-333-472	PT6347	
C87	33			D6-330	GP1K-330	UC-5433	
C88	1000		62-02209001	D6-102	GP2L-102	UC-521	
C89	10000		30-1238-3	DD-103	811-01	DC-511	
C90	2200	500	60-20225434			MCB460	
C91	82	500	60-00825437	D6-820	801-820		
C92	390	500	60-10395437	D6-391	811-391	MCB343	
C93	390	500	60-10395417	D6-391	811-391	MCB343	
C94	5000		30-1238-1	DD-502	811-006	DC-525	
C95	10000		30-1238-3	DD-103	811-01	DC-511	
C96	.47	100	30-4671-68			PT4047	
C97	10000		30-1238-3	DD-103	811-01	DC-511	
C98	10000		30-1238-2	DD-103	811-01	DC-511	
C99	.033	600	30-4650-61	DF-303		PT6133	
C100	82	4000		DD80-820			
C101	.01	600	30-4650-58	DD-103	811-01	PT611	
C102	.01	600	30-4650-58	DD-103	811-01	PT611	

Note 2. Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	15KΩ	½	33-5573	QJ-642*	RTV-513		UE-7965	Contrast (Panel) Tap at 10KΩ
B	250KΩ	½						Volume (Rear) Tap at 160KΩ
C	Switch							Attach to R1B
R2A	100KΩ	½	33-5573-9	QU-128	A47-100K-S	B-40	TA15L	Brightness
B	Shaft		Not Req.	Not Req.	F3-3	Not Req.	Not Req.	Attach to R2A
R3A	3Meg	½	33-5572-14	QU-140	A47-3Meg-S	B-84	TA36L	Vertical Hold
B	Shaft		Not Req.	Not Req.	F3-3	Not Req.	Not Req.	Attach to R3A.
R4A	50KΩ	½	33-5572-8	QU-123	A47-50K-S	B-31	TA54L	Horizontal Hold
B	Shaft		Not Req.	Not Req.	Not Req.	Not Req.	Not Req.	Attach to R4A
R5A	15KΩ	4	33-5546-56	4WK-15000	A10-15K	SVP-996	M15MPK	Width (Wire Wound)
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R5A
R6A	250KΩ	½	33-5572	QU-130	A47-250K-S	AB-50	TA254L	Horizontal Frequency
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R6A	250KΩ	½	33-5565-17	QU-130	A47-250K-S	AB-90	TA254L	Horizontal Frequency-See Note 1.
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	1500Ω	½	33-5572-13	QU-109	A47-1500-S		TA152L	Vertical Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4		Not Req.	Attach to R7A
R8A	2.5Meg	½	33-5572-1	QU-339	A472-5Meg-S	BX-83	TA255L	Height
B	Shaft		Not Req.	RQ	FKS-1/4		Not Req.	Attach to R8A

*CONCENTRIKIT EQUIVALENT: K-2 KIT, BASE ELEMENTS AND SHAFTS; B13-118X, P1-128 (Panel)
B13-130X, R1-212 (Rear)
70-1 Switch

Note 1. Used in some versions.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	NOTES
R9	470KΩ	½	66-4478240	BTS-470K	
R10	150KΩ	½	66-4158340	BTS-150K	
R11	22KΩ	½	66-3228340		
R12	470KΩ 5%	½	66-4478340		
R13	470KΩ 5%	½	66-4478340		
R14	68Ω	1		BTS-680	
R15	1800Ω	1		BTA-1800	
R16	2700Ω	1		BTS-2700	
R17	1500Ω	1		BTS-1500	
R18	220Ω	½	66-1228340	BTS-220	
R19	22KΩ	½	66-3228340		
R20	150KΩ	½	66-4158340		
R21	100KΩ	½	66-4108340		
R22	8200Ω	½	66-2828340		
R23	8300Ω	2	66-2825340		
R24	47KΩ	½	66-3478340		
R25	220Ω	½	66-1228340	BTS-220	
R26	1000Ω	½	66-2108340	BTS-1000	
R27	1Meg 5%	½	66-5108340	BTS-1Meg 5%	
R28	1Meg	½	66-5108240	BTS-1Meg	
R29	470KΩ	½	66-4478340	BTS-470K	
R30	180KΩ	½	66-4188340	BTS-180K	
R31	220KΩ	½	66-4228340	BTS-220K	
R32	56KΩ	½	66-3568340	BTS-56K	
R33	510KΩ 5%	½	66-4518240	BTS-510K 5%	
R34	10Meg 5%	½	66-5108240	BTS-10Meg5%	
R35	10Meg	½	66-5108340		
R36	15KΩ	2	66-3155340	BTB-15K	Note 1
R37	112KΩ	½	66-3128540		
R38	1000Ω	½	66-2108340	BTS-1000	
R39	220Ω	½	66-1228340	BTS-220	
R40	220Ω	½	66-1228340	BTS-220	
R41	47Ω	½	66-0478340	BTS-47	
R42	5000Ω	7	33-1335-95	PW7-5000	
R43	1000Ω	½	66-2108340	BTS-1000	
R44	12KΩ	½	66-3128340		
R45	220Ω	½	66-1228340	BTS-220	
R46	220Ω	½	66-1228340	BTS-220	
R47	12KΩ	2	66-3125340		
R48	68Ω	½	66-0688340	BTS-68	
R49	220Ω	½	66-1228340	BTS-220	
R50	220Ω	½	66-1228340	BTS-220	
R51	6800Ω	½	66-2688340		
R52	470KΩ	½	66-4478340		
R53	3900Ω	½	66-2398340		
R54	1Meg	½	66-5108340		

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	NOTES
R55	33KΩ	2	66-3335340		
R56	39KΩ	½	66-3398340		
R57	47KΩ	½	66-3478340		
R58	5000	7	33-1335-95	PW7-5000	
R59	33Ω	½	66-0338340		Note 2
R60	470KΩ	½	66-4478340		
R61	2200Ω	½	66-2228340		
R62	56000Ω	½	66-3568340		
R63	150KΩ	½	66-4158340		
R64	22KΩ	½	66-3228340		
R65	15KΩ	½	66-3158340	BTS-15K	
R66	330Ω	½	66-1338340	BTS-330	
R67	33KΩ	½	66-3338340	BTS-33K	
R68	47Ω	½	66-0478340	BTS-47	
R69	270Ω	½	66-1278340	BTS-270	
R70	22KΩ	½	66-3228340	BTS-22K	
R71	10KΩ	½	66-3108340	BTS-10K	
R72	10Meg	½	66-6108340	BTS-10Meg	
R73	220KΩ	½	66-4228340	BTS-220K	
R74	470KΩ	½	66-4478340	BTS-470K	
R75	68Ω	2	66-0685340	BTB-680	
R76	270Ω	2	66-1274340		
R77	680KΩ	½	66-4688340		
R78	150KΩ	½	66-4158340		
R79	33KΩ	½	66-3378340		
R80	390KΩ	½	66-4398340		
R81	680KΩ	½	66-4688340		
R82	82000Ω	½	66-2828340		
R83	12KΩ	2	66-3125340		
R84	220KΩ	½	66-4228340		
R85	22KΩ	½	66-3228340		
R86	15KΩ	½	66-3158340		
R87	82000Ω	½	66-2828340		
R88	1Meg	½	66-5108340		
R89	82000Ω	½	66-2828340		

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	NOTES
R90	220KΩ	1	66-4184340		
R91	680Ω	½	66-1688240		
R92	1.8Meg	½	66-5188340		
R93	820KΩ	½			Note 3
R94	3.3Meg	½	66-5338340		
R95	27KΩ	1	66-3274340	BTA-27K	
R96	27KΩ	1	66-3274340	BTA-27K	
R97	330Ω	½	66-1334340		
R98	1000Ω	½	66-2108340		
R99	1000Ω	½	66-2108340		
R100	1Meg	½	66-5108340		
R101	1Meg	½	66-5108340		
R102	47KΩ	1	66-3474340	BTA-47K	
R103	220KΩ	½	66-4228340		
R104	4.7Meg	½	66-5478340		
R105	15KΩ	½	66-3158340		
R106	4700Ω	½	66-2478340		
R107	47KΩ	½	66-3478340		
R108	10KΩ	½	66-3108340		
R109	56KΩ	½	66-3568340		
R110	39KΩ	½	66-3398340		
R111	12000Ω	½	66-3128340		
R112	180KΩ	½	66-4188340		
R113	4.7Meg	½	66-5478340		
R114	1Meg	½	66-5108340		
R115	8200Ω	½	66-2828340		
R116	6500Ω	7	33-1335-125		
R117	82KΩ	1	66-4108340	BTA-82K	
R118	22KΩ	2	66-3225340	BTB-22K	Note 4
R119	33KΩ	2	66-3335340	BTB-33K	Note 4
R120	12KΩ	½	66-3128540		
R121	330Ω	1		BTA-330	
R122	1ΩΩ	1			
R123	1Meg	½	66-5108340	BTS-1Meg	
R124	100KΩ	2	66-4105340	BTB-100K	

Note 1. Not used in some versions.
Note 2. Some versions use a 22Ω ½W resistor in this application.
Note 3. Some versions use a 1Meg ½W resistor in this application.
Note 4. Some versions use a 15K 2W resistor in this application.
When this resistor is used, R118, R119 are deleted.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⑪1.9A	520VCT .280ADC	5VAC ⑫6A	32-8661		P-2839 ①			26R34 ②	
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑨9.8A									

① Tape 6.3V ⑨ 3.6A winding.
② Tape two 6.3V ⑨ 1.2A windings.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA PHILCO PART No	Halldorson PART No	Merit PART No	RCA TYPE No.	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No.
T2	Horiz. Output Trans.	32-8666-1	FB419 & RF800* ⑤	HVO-38* ④	2357I & 214R1* ⑤	X094* ④	A-8253* ④	FLY-16 & WC-20*④	D-50 & WC-11*④
T3	Vert. Output Trans.	32-8668 ① 21900 ②		A-2822 ③			A-8149 ⑤	26S7I ③	
T4A	Yoke (90°) Horiz. (30MH)	32-8667 ① 76-9173-2						Y-15 ⑤	
B	Vert. (42MH)	32-9683-1 ④							

① Alternate Philco part number.
② Use 6 to 1 turns ratio.
③ Connect as auto transformer.
④ Drill new mounting holes.
⑤ Use original damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	4	H. V. Rect. Plate Lead	H. V. Rect. Plate Leadq	H. V. Rect. Plate Lead	H. V. Rect. Plate Lead	H. V. Rect. Plate Lead	H. V. Rect. Plate Lead	H. V. Rect. Plate Lead
	12	9	9	9	9	8	9	9
	2	7	7	7	7	1	7	7
	6	See Note ⑤	See Note ⑤	See Note ⑤	See Note ⑤	See Note ⑤	See Note ⑤	See Note ⑤
	1	1	1	1	1	4	1	1
	8	Term #3 of RF 800	2	Term "D" of 214R1	6	6	Term #1 of WC-20	Orange term of WC-11
	7	Term #4 of RF 800	8	Term "E" of 214R1	2	7	Term #3 of WC-20	Black term of WC-11
Connect Width Coil Across		Terms #1& #2 of RF800 across 3 & 1.		Terms "A" & "B" of 214R1 across 3 & 1.			Terms #3 & #4 of WC-20 across 3 & 1.	Red & blue terms of WC-11 across 3 & 1.
Special Notes		⑥ ⑦	⑧	⑥ ⑦	⑧	⑥	⑥ ⑦	⑥ ⑦

⑥ Connect R120 in series with C100 across yoke terms #1 & #2. (Yoke socket pins #5 & #3.)
⑦ If the picture is out of phase, reverse width coil primary or secondary.

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA PHILCO PART No	QUAM PART No.	NOTES
SP1	8"	PM	3.5Ω	38-1651-11 ① 45-9735 ②	8A625.2	① Used in models 24C6110, 24C6112, 24C6110L, and 24C6310. ② Used in model 24C6012.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA PHILCO PART No	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	5.2KΩ	3.5Ω Tap ⑨ .29Ω Feed Back Winding	32-8684						

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	VHF Ant. Matching Transformer							
L2	VHF Ant. Matching Transformer							
L3	IF Trap							Wound on capacitor
L4	IF Trap	0Ω						
L5	UHF IF Coil	0Ω						
L6	UHF IF Coil	0Ω						
L7	VHF Ant. Coils	0Ω						
L8	VHF Ant. Coil	0Ω						Channel 6
L9	VHF Ant. Coil	0Ω						Channel 13
L10	Neut. Coil	0Ω						
L11	VHF RF Coil	0Ω						Channel 13
L12	VHF RF Coils	0Ω						
L13	VHF RF Coil	0Ω						Channel 6
L14	UHF IF Coil	0Ω						
L15	VHF Mixer Grid Coil	0Ω						Channel 13
L16	VHF Mixer Grid Coils	0Ω						
L17	VHF Mixer Grid Coil	0Ω						Channel 6
L18	UHF IF Coil	0Ω						
L19	VHF Osc. Coil	0Ω						Channel 13
L20	VHF Osc. Coils	0Ω						
L21	VHF Osc. Coil	0Ω						Channel 6
L22	RF Coil	0Ω						
L23	RF Coil	0Ω						
L24	Conv. Plate	0Ω						Tapped
L25	47.25MC Trap	.4Ω		32-4597-11	19-1003		4608	3.6 Microhenries
L26	41.25MC Trap	.4Ω		32-4597-11	19-1003		4608	3.6 Microhenries
L27	RF Coil	0Ω		32-4597-16	19-1005		4613	9.7 Microhenries - Not used in some versions
L28A	47.25MC Trap	.1Ω		32-4597-3				3.1 Microhenries
B	Int. Video IF	.2Ω						.84 Microhenry-Note 1
L29	Fil. Choke	0Ω		32-4112-49	19-1002		4606	3 Microhenries
L30	2nd. Video IF	.1Ω	.1Ω	32-4486-41	17-4523	TV-120	6319	
L31	3rd. Video IF	.1Ω	.1Ω	32-4486-42	17-4523	TV-120	6319	
L33	4th. Video IF	.1Ω	.1Ω	32-4486-43	17-4524	TV-120	6319	
L33	Series Peaking Coil	1.5Ω		32-4112-53	19-1003		4606	3 Microhenries
L34	Series Peaking Coil	8.2Ω		32-4422-27	19-1005		4613	10 Microhenries, IRCppart #CL-1
L35	Series Peaking Coil	3.4Ω		32-4487-22	19-3125		6153	125 Microhenries
L36	Shunt Peaking Coil	1Ω			19-1223		4611	300-400 Microhenries
L37	4.5MC Trap	1.7Ω		32-4483-2				
L38	Shunt Peaking Coil	7.5Ω		32-4480-4	19-3250	TV-125	6181	340 Microhenries
L39	Series Peaking Coil	4.2Ω		32-4480-9	19-3180	TV-124	6180	180 Microhenries
L40	Sound IF	4.3Ω		32-4483-10	17-5413			
L41	Ratio Det.	5.3Ω	.8QCT	32-4450-6A	17-3497	TV-115	6305	Tertiary winding-.8Ω
L42	Fil. Choke	0Ω		32-4112-49	19-1002		4606	3 Microhenries
L43	Horiz. Osc.	160Ω		32-4557-3	19-1576	TV-163	6310	
L44	RF Choke	3.4Ω		32-4112-50	19-1006		4634	15 Microhenries
L45	RF Choke	3.4Ω		32-4112-50	19-1006		4634	15 Microhenries
L46	RF Choke	1.8Ω		32-4112-50	19-1006		4634	15 Microhenries

Note 1. L38A is not used in some versions. When L38A is not used, L38B is part number 32-4597-3.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ~	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L47	.280ADC	43Ω	1.18HY	32-8654					

PHILCO MODELS 24C6010, 24C6012, 24C6109, L, 24C6110, L, 24C6112, 24C6310 (Ch. TV354)

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

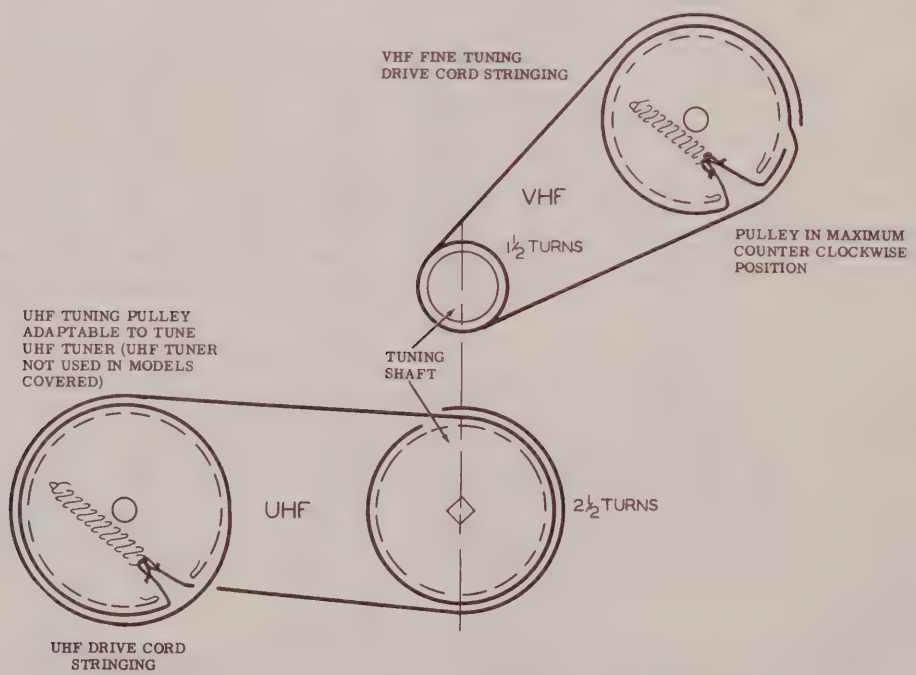
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PHILCO PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	7/10A 250V	AD2246-15	76-4519-2	313. 700 (3AG-S/B 7/10A)	357001	MDL 7/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		PHILCO PART No.	SYLVANIA PART No.	
M2	1N64	34-8022	1N60 or 1N132	Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Dial Light	3463-4	#1847
M4	Tuner	76-8946-2	VHF
M5	Switch	42-2035	Range (DP-3 Position-Wafer Type)
M6	Focus Magnet	76-9014-1	Includes Centering Device
M7	Ion Trap	76-6077-4	Models 24C6012, 24C6110, 24C6112, 24C6310
	Ion Trap	76-5088-4	Model 24C6110L
M8	Correction Magnet	76-8897	Top
M9	Correction Magnet	76-8897-1	Bottom
	Cabinet	11055	Metal-Model 24C6012
	Cabinet	11066	Mahogany-Model 24C6110
	Cabinet	11069	Mahogany-Model 24C6112
	Cabinet	11078	Mahogany-Model 24C6310
	Cabinet	11066-1	Light-Model 24C6110L
	Knob	54-6140-3	Brightness-Models 24C6110, 24C6110L and 24C6012
	Knob	54-3140-1	Brightness-Models 24C6112, 24C6310
	Knob	76-9118-1	Channel Selector-Models 24C6110, 24C6110L, 24C6012
	Knob	76-9118	Channel Selector-Model 24C6112, 24C6310
	Knob	76-6213-6	Contrast-Models 24C6012, 24C6110, 24C6112, 24C6110L, and 24C6310
	Knob	76-6104-9	Fine Tuning-Models 24C6012, 24C6110, 24C6112, 24C6110L, and 24C6310
	Knob	54-6140-3	Horiz. & Vert. Hold-Models 24C6110, 24C6110L, 24C6012
	Knob	54-6140-1	Horiz. & Vert. Hold-Models 24C6112, 24C6310
	Knob	54-6140-2	Range Switch-Models 24C6110, 24C6110L, and 24C6012
	Knob	54-6140	Range Switch-Models 24C6112, and 24C6310
	Knob	54-6137-1	On-Off-Volume-Models 24C6110, 24C6110L, and 24C6012
	Knob	54-6137	On-Off-Volume-Models 24C6112, 24C6310
	Mask	54-9033-7	Models 24C6110, 24C6110L, 24C6012
	Mask	54-9033-8	Models 24C6112, 24C6310
	Safety Glass	54-9213-38	Models 24C6110, 24C6110L, 24C6012
	Safety Glass	54-9213-39	Models 24C6112, 24C6310
	Dial	76-9048	Models 24C6110L, 24C6310, 24C6012
	UHF Window	54-9330	Models 24C6110, 24C6110L



DRIVE CORD STRINGING

PROPERTY OF
L. F. DRAKE SHIP
3624 WEAVER ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check T2, T4A, C97, C99, C98, C2B, R122, R116, R5 and other associated components.	Check L43, C90, C91, C92, C94, R105, R106, R107, R109, R111 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17, V19 and V20. Check C94, R116, R5, T2, T4A and other associated components.

BLOOMING

Check by substitution V16, V17, V18, V19 and V20. Check C94, C96, R116, R5, T2, T4A and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or no Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set". Check bias to grids of V6 and V16.

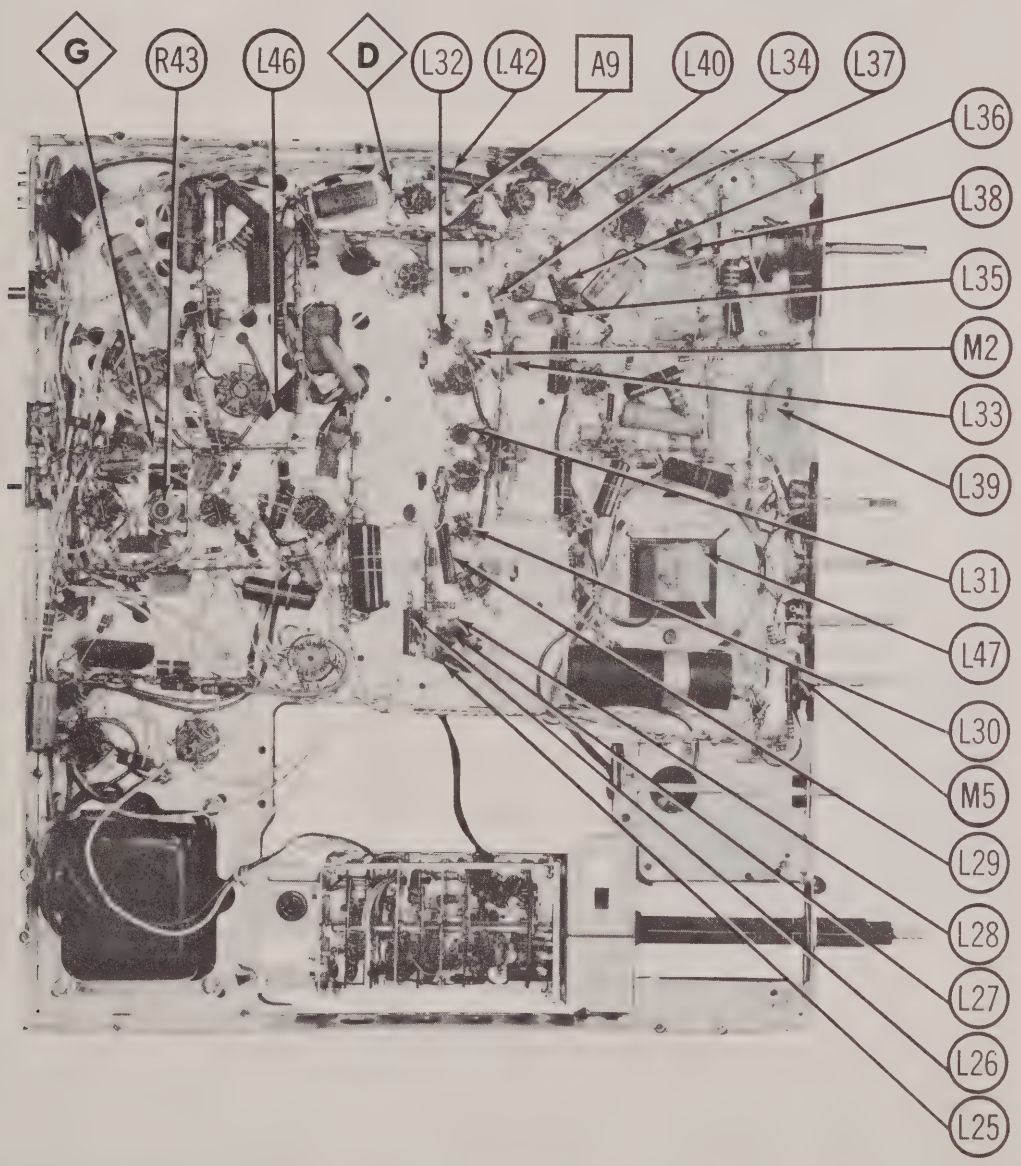
KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

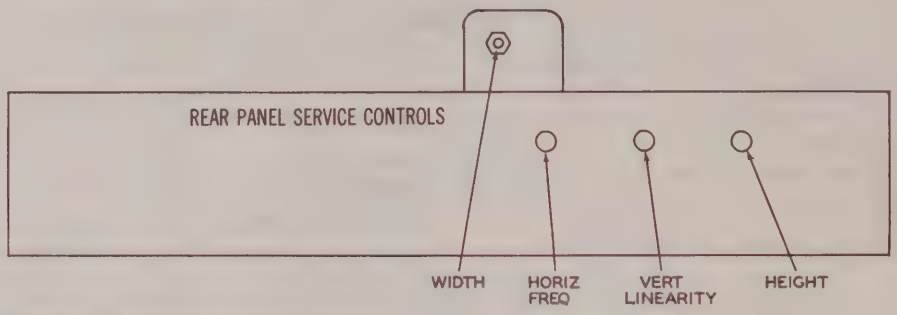
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding metal strip at the top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency control (R6) until picture synchronizes horizontally. If results are unsatisfactory refer to the horizontal sweep circuit adjustments.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L41) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the top and bottom of the raster are visible, and position the magnets so that the top and bottom are straight lines and the corners are at right angles.

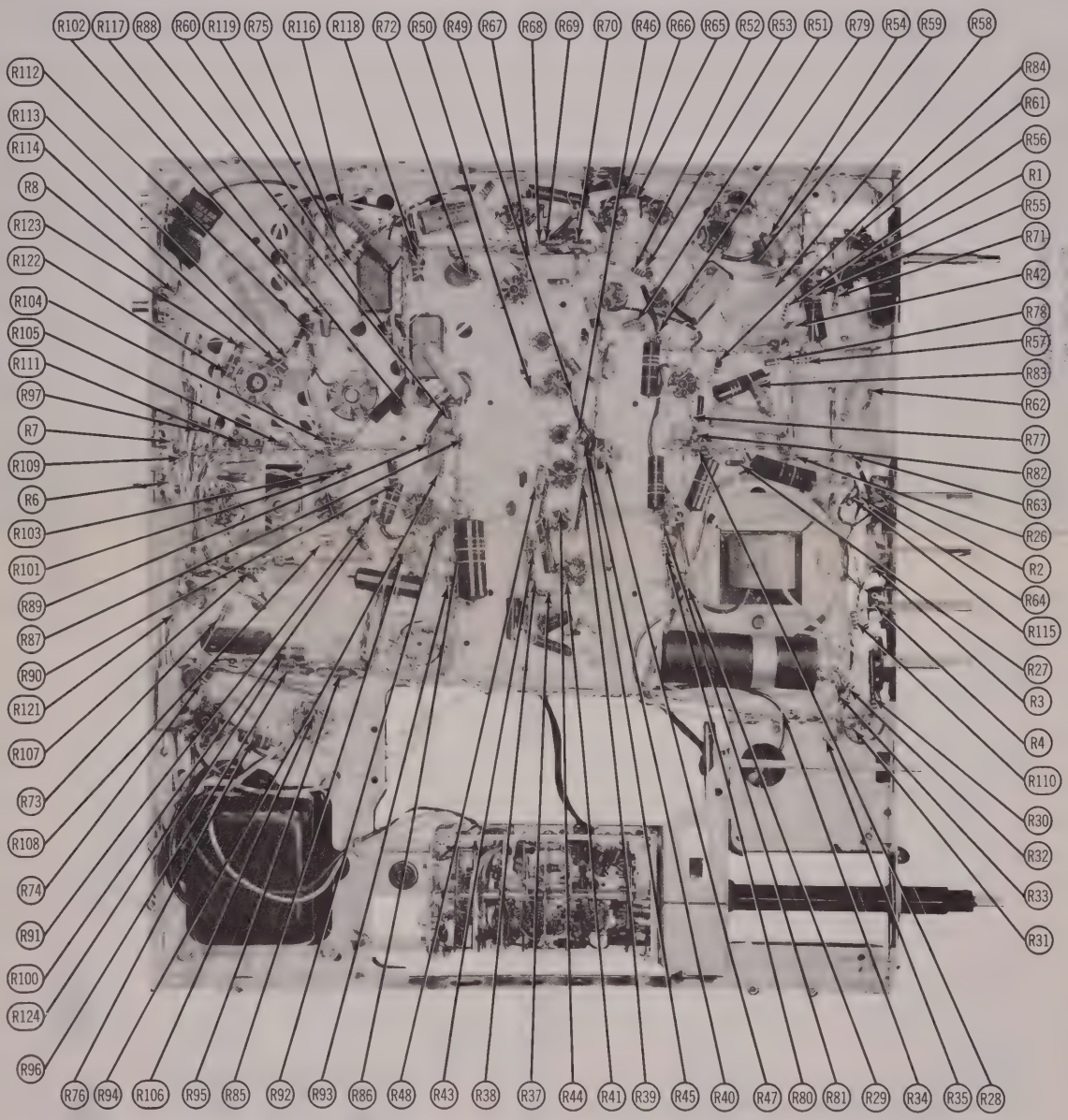
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove name plate from front of cabinet by a slight upward and inward twist.
2. Remove 8 push-on type control knobs.
3. Disconnect antenna terminals.
4. Remove 5 wood screws. Remove rear cover.
5. Disconnect picture tube socket, HV lead, yoke plug and speaker leads.
6. Remove 5 chassis bolts. Remove chassis.

PICTURE TUBE REMOVAL

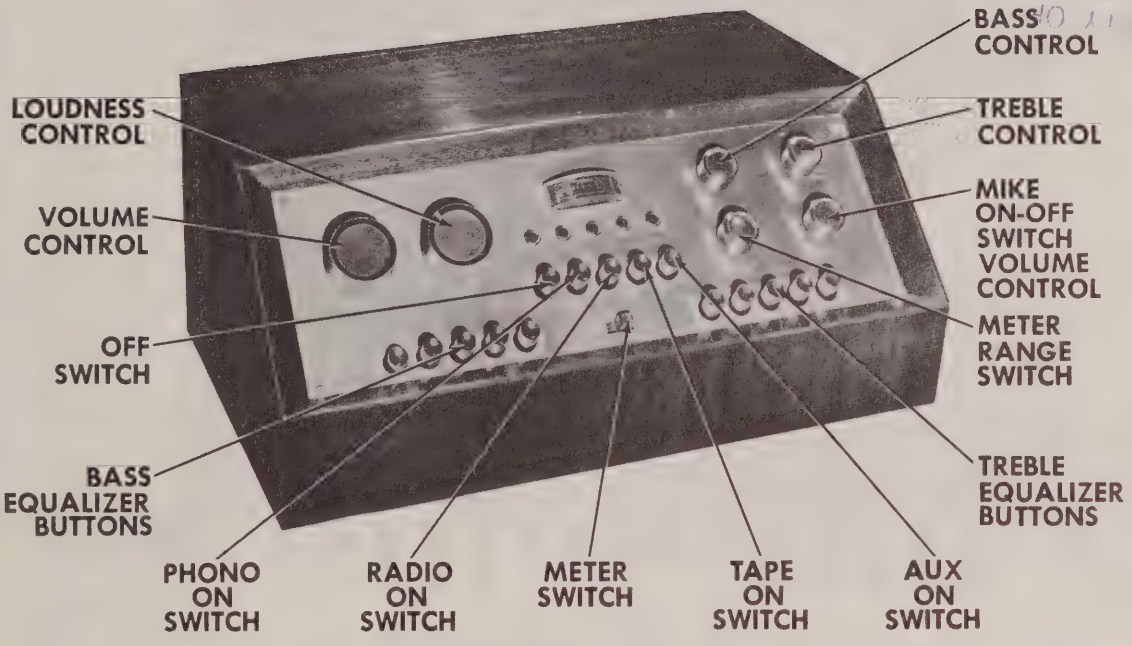
1. Lay cabinet face down on a soft surface.
2. Remove 2 wood screws from yoke assembly braces.
3. Remove 4 hex nuts holding strap to cabinet.
4. Lift picture tube and yoke assembly from cabinet.
5. Remove Ion trap and metal screws holding strap together.
6. Lift yoke assembly from neck of picture tube.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

DENVER, COLORADO
4000 MEADE ST.
...RENSHIP

PILOT MODEL
PA-913



PILOT MODEL
PA-913

TRADE NAME	Pilot Model PA-913
MANUFACTURER	Pilot Radio Corp., 37-06 36th. St., Long Island City 1, N.Y.
TYPE SET	AC Operated 5 Channel Audio Pre-amplifier & Equalizer
TUBES (Six)	Types 5879 Phono Preamp., 12AX7 Preamp.- Mic Preamp., 12AX7 Mixer Amp.-AF Amp 12AT7 Meter Amp.-Meter Rectifier, 12AU7 Cath. Follower, 6X4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles RATING .26 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Preamp.	5879	5879	9AD	
V2	Phono Preamp.-Mic Preamp.	12AX7	12AX7	9A	
V3	Mixer Amp.-AF Amp.	12AX7	12AX7	9A	
V4	Meter Amp.-Meter Rectifier	12AT7	12AT7	9A	
V5	Cathode Follower	12AU7	12AU7	9A	
V6	Rectifier	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	▲40	350			TM-5030-350	D-405	
B	■80	250			TD-80-350	MT-25100	
C	▲20	250					
C2A	▲40	250			TM-4020-250	T-080	
B	■20	250					
C3A	▲250	35			TM-500-50		
B	▲500	35			TD-250-50		
C4A	20	10		FP208	TM-T20-25	T-005	
B	■20	10					Note 1
C	▲20	10					
C5	25	25		TC26	TD-25-25	FM-0225	
C6	25	25		TC26	TD-25-25	FM-0225	

Note 1. Section C4C not used.

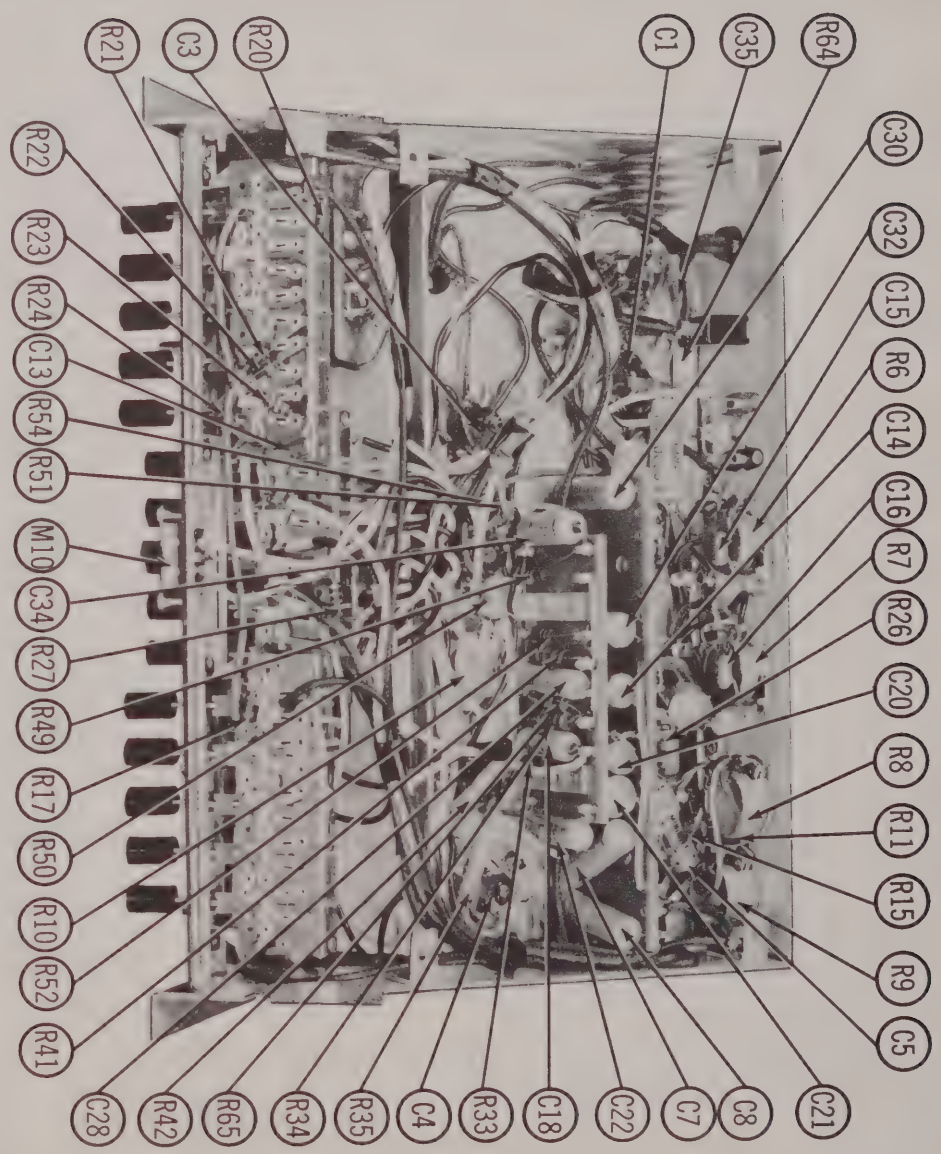
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: PILOT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C7	.1	200		DF-104		PT401	
C8	.047	400		DF-503		PT4147	
C9	82			TCZ-82	NP0-337-82		
C10	.033	400					
C11	.022	400					
C12	.0051	400					
C13	1500				811-152		
C14	.047	400		DF-503		PT4147	
C15	250			D6-251	811-251		
C16	250			D6-251	811-251		
C17	250			D6-251	811-251		
C18	.022	400		DF-203		PT4122	
C19	250			D6-251	811-251		
C20	.047	400		DF-503		PT4147	
C21	.1	400		DF-104		PT401	
C22	.033	400		DF-303		PT4133	
C23	50			D6-500	831-500		
C24	1000				811-102		
C25	1200				811-122		
C26	.047	400		DF-503		PT4147	
C27	6.8			TCZ-6R8	NP0A-6R8		
C28	.033	400		DF-303		PT4133	
C29A	150		♦	D6-151	811-151	UC-5315	
B	50		♦	D6-500	831-500	UC-545	
C	2500		♦	D6-252	GP2-333-252	UC-5225	
D	2500		♦	D6-252	GP2-333-252	UC-5225	
C30	.047	400		DF-503		PT4147	
C31	.1	200		DF-104		PT401	
C32	.047	400		DF-503		PT4147	
C33	.1	200		DF-104		PT401	
C34	.022	600		DF-203		PT6122	
C35	.01	600		D6-103	GP3-333-103	PT411	

♦ Items C29A, C29B, C29C, C29D, R55A and R55B are included with loudness control.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PILOT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	36-53B				UF55-T254	Volume-tapped @290KΩ
B	1Meg	½					UR16L	Attach to R1A
C	Shaft						DS-36	Attach to R1A and R1B
R2	1Meg	½	36-56A			C1-70		Loudness tapped @400KΩ and 650KΩ
R3A	5Meg	½	37-31A	Q13-141	A47-5Meg-Z	AB-88	U-65	Bass
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R3A
R4A	5Meg	½	37-31A	Q13-141	A47-5Meg-Z	AB-88	U-65	Treble
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R4A
R5A	500KΩ	½	39-52B			ABT-160		Mic volume- tap @ 150KΩ and 250KΩ
B	Shaft		Not Req.			AK-3		Attach to R5A
C	Switch					KB-1		Attach to R5A
R6A	1Meg	½	39-41A	Q19-137X	A47F5-1Meg	ABT-74		Tape level tapped @650KΩ
B	Shaft		Not Req.	SQ	FKS-1/4	AK-1		Attach to R6A
C	Switch	½	39-41A	Q19-137X	A47F5-1Meg	ABT-74		Radio Level tapped @ 650KΩ
R7A	1Meg	½	39-41A	Q19-137X	A47F5-1Meg	ABT-74		Radio Level tapped @ 650KΩ
B	Shaft		Not Req.	SQ	FKS-1/4	AK-1		Attach to R7A
R8A	1Meg	½	39-39	Q11-137	A47-1Meg-S	AB-69	U-54	Phono Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	100KΩ	½	39-32C	Q11-128	A47-100K-S	AB-40	U-41	Phono Load
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R9A
R10A	25KΩ	½	39-33A	Q11-120	A47-25K-S	AB-26	SU-29	Meter Zero adjustment
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R10A

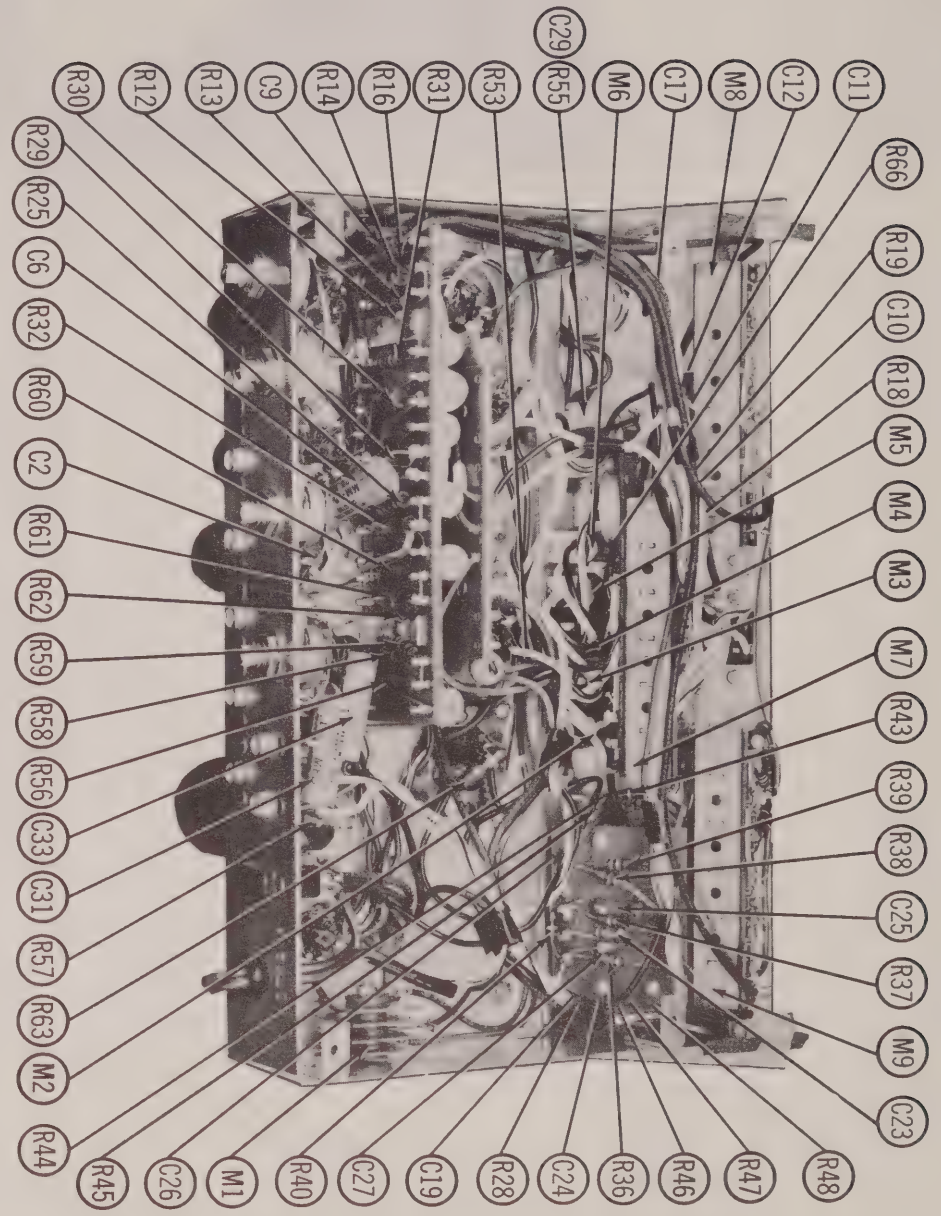
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	PILOT PART No.	IRC PART No.	
R11	6800Ω	½		BTS-6800	
R12	1Meg	½		BTS-1Meg	
R13	330KΩ	½		BTS-330K	
R14	100KΩ	1		BTA-100K	
R15	1000Ω	½		BTS-1000	
R16	270KΩ	½		BTS-270K	
R17	8200Ω 5%	½		BTS-8200 5%	
R18	100KΩ 5%	½		BTS-100K 5%	
R19	82KΩ 5%	½		BTS-82K 5%	
R20	15KΩ 5%	½		BTS-15K 5%	
R21	100KΩ 5%	½		BTS-100K 5%	
R22	150KΩ 5%	½		BTS-150K 5%	
R23	39KΩ 5%	½		BTS-39K 5%	
R24	1Meg	½		BTS-1Meg	
R25	82KΩ	1		BTA-82K	
R26	3300Ω	1		BTA-3300	
R27	47KΩ	½		BTS-47K	
R28	39KΩ	½		BTS-39K	
R29	2.2Meg	½		BTS-2.2Meg	
R30	82KΩ	1		BTA-82K	
R31	4.7Meg	½		BTS-4.7Meg	
R32	12KΩ	1		BTA-12K	
R33	2.2Meg	½		BTS-2.2Meg	
R34	82KΩ	1		BTA-82K	
R35	2200Ω	1		BTA-2200	
R36	220KΩ	½		BTS-220K	
R37	220KΩ 5%	½		BTS-220K 5%	
R38	4700Ω 5%	½		BTS-4700 5%	
R39	220KΩ	½		BTS-220K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	PILOT PART No.	IRC PART No.	
R40	100KΩ	½		BTS-100K	
R41	82KΩ	1		BTA-82K	
R42	2200Ω	1		BTA-2200	
R43	100KΩ 5%	½		BTS-100K 5%	
R44	33KΩ 5%	½		BTS-33K 5%	
R45	10KΩ 5%	½		BTS-10K 5%	
R46	3300Ω 5%	½		BTS-3300 5%	
R47	1000Ω 5%	½		BTS-1000 5%	
R48	470Ω 5%	½		BTS-470 5%	
R49	100KΩ	½		BTS-100K	
R50	1500Ω	½		BTS-1500	
R51	2.2Meg	½		BTS-2.2Meg	
R52	22KΩ	½		BTS-22K	
R53	1000Ω	½		BTS-1000	
R54	27KΩ	½		BTS-27K	
R55A	100KΩ	½	♦	BTS-100K	
B	100KΩ	½		BTS-100K	
R56	68KΩ	½		BTS-68K	
R57	4700Ω	1		BTA-4700	
R58	470Ω	½		BTS-470	
R59	10KΩ	½		BTS-10K	
R60	68KΩ	½		BTS-68K	
R61	470Ω	½		BTS-470	
R62	10KΩ	½		BTS-10K	
R63	13Ω 5%	1		BTA-13 5%	
R64	4700Ω	5		PW7-4700	
R65	10KΩ	1		BTA-10K	
R66	2.7Ω	1		BTB-2.7	

♦ Items C29A, C29B, C29C, C29D and R55A, R55B are included with loudness control.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	PILOT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.26A	480VCT .019ADC	61VAC .140ADC	6.3VCT @1.28A	55-45					

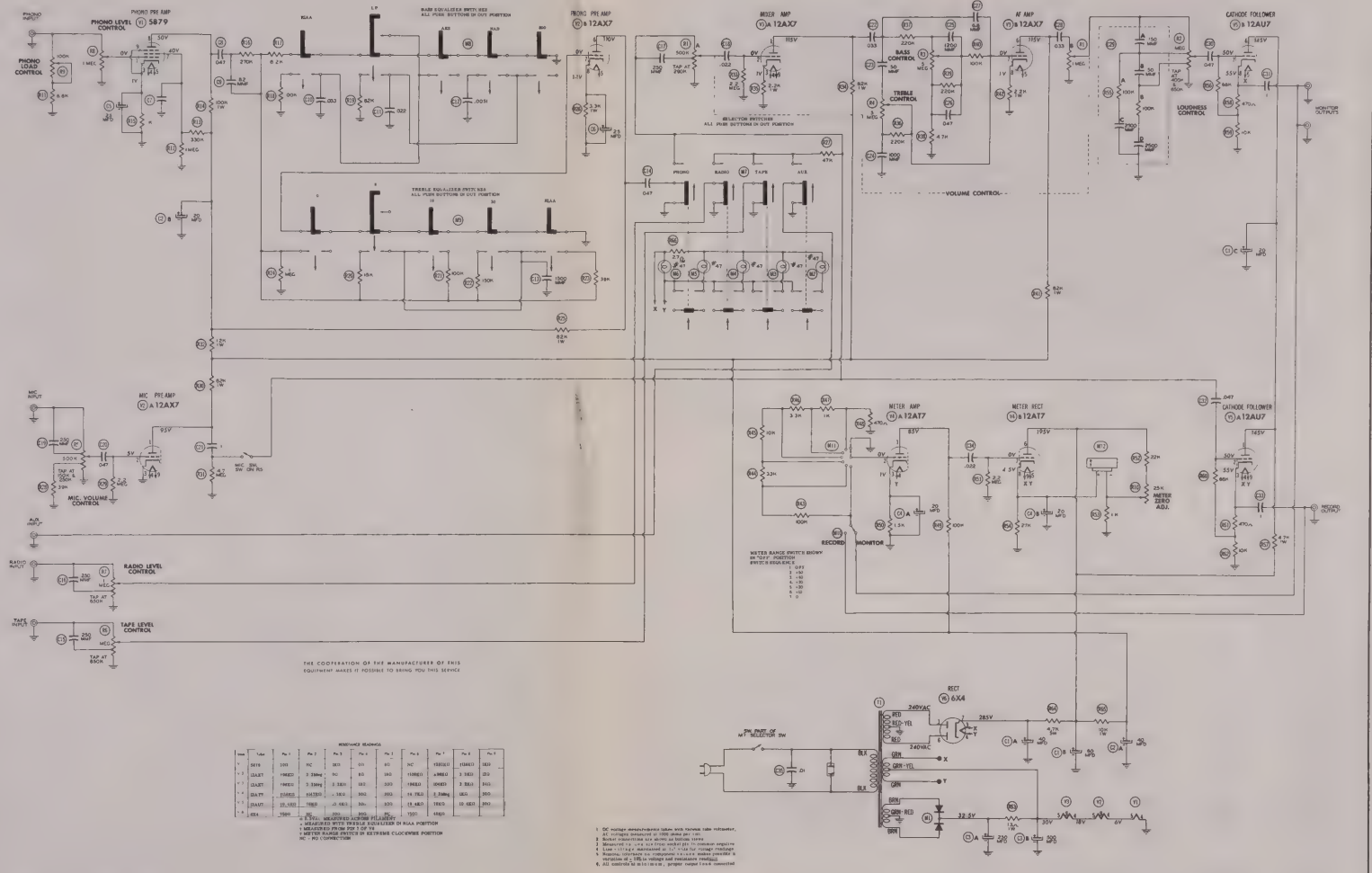
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	PILOT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.140ADC	110-494						

MISCELLANEOUS

ITEM No.	PART NAME	PILOT PART No.	NOTES
M2	Pilot Light		#47 - Auxiliary selection indicator
M3	Pilot Light		#47 - Tape Selection indicator
M4	Pilot Light		#47 - Radio Selection indicator
M5	Pilot Light		#47 - Phono Selection indicator
M6	Pilot Light		#47 - On-off Indicator
M7	Switch	101-40	Power & Selector (Pushbutton-Slide type)
M8	Switch	101-39	Bass Equalizer (Pushbutton-Slide type)
M9	Switch	101-39	Treble Equalizer (Pushbutton - Slide type)
M10	Switch	101-29	Meter Monitor & record (SPDT-slide type)
M11	Switch	100-101	Meter Range (Single Pole-7 position)
M12	Meter	110-495	Decibel

CHASSIS—TOP VIEW



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

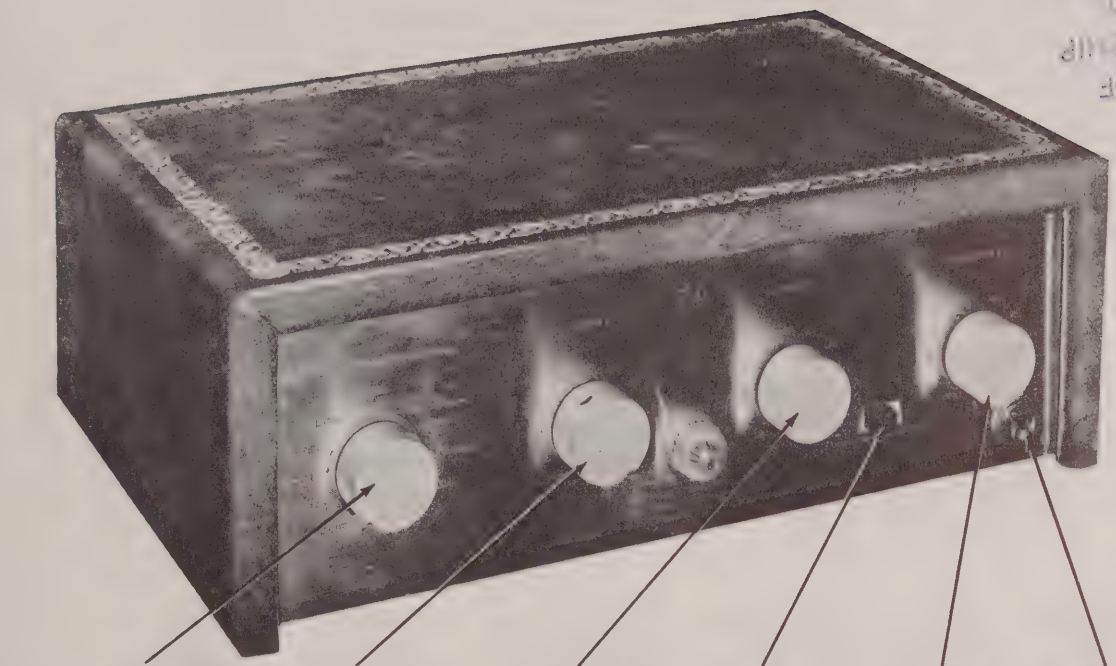
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
*	5879	205	NC	385	0V	6V	NC	150KΩ	150KΩ	385
* †	12AX7	99KΩ	2.35MΩ	NC	8V	1MΩ	150KΩ	6.9MΩ	2.35Ω	205
* †	12AX7	99KΩ	2.35MΩ	2.35Ω	182	205	150KΩ	104KΩ	2.35Ω	241Ω
*	12AT7	154KΩ	447Ω	0Ω	30Ω	30Ω	96	7.2Ω	2.34MΩ	0Ω	30Ω
* †	12AU7	19.4KΩ	98Ω	0.6Ω	30Ω	30Ω	19.4KΩ	18KΩ	19.4KΩ	29Ω
*	6X4	350Ω	NC	350Ω	350Ω	NC	700Ω	640Ω		

MEASUREMENTS MADE WITH 20,000 OHMS PER VOLT METER
* = 0 VOL. MEASURED ACROSS FILAMENT
† = MEASURED WITH TREBLE EQUALIZER IN RIAA POSITION
‡ MEASURED FROM TOP T OF '74
# METER RANGE SWITCH IN EXTREME CLOCKWISE POSITION
NC = NO CONNECTION

1. DC voltage measurements taken with Hickok tube voltmeter, 20,000 ohms per volt, unless otherwise noted.
2. Socket connections are viewed as bottom views.
3. Measured with line set for 117 volts.
4. Line voltage maintained at 117 volts for voltage readings.
5. Ranges, tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. All controls in minimum, proper output level connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W Sams & Co., Inc 1955

H. H. SCOTT
MODEL 120-CP



H. H. SCOTT
MODEL 120-CP

TRADE NAME	H. H. Scott Model 120-CP
MANUFACTURER	Hermon Hosmer Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.
TYPE SET	AC Operated 5 Channel Audio Preamplifier & Equalizer
TUBES (Four)	Types 12AU7 Preamp., 12AU7 Cath. Follower-AF Amp., 6BK7 AF Amp.-Cath. Follower, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.25 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		H. H. SCOTT PART No.	STANDARD REPLACEMENT		
V1	Preamp.	12AU7	12AU7	9A	
V2	Cath. Follower-AF Amp.	12AU7	12AU7	9A	
V3	AF Amp. - Cathode Follower	6BK7	6BK7	9AJ	
V4	Rect.	6X4	6X4	5BS	

ELECTROLYTIC CAPACITORS

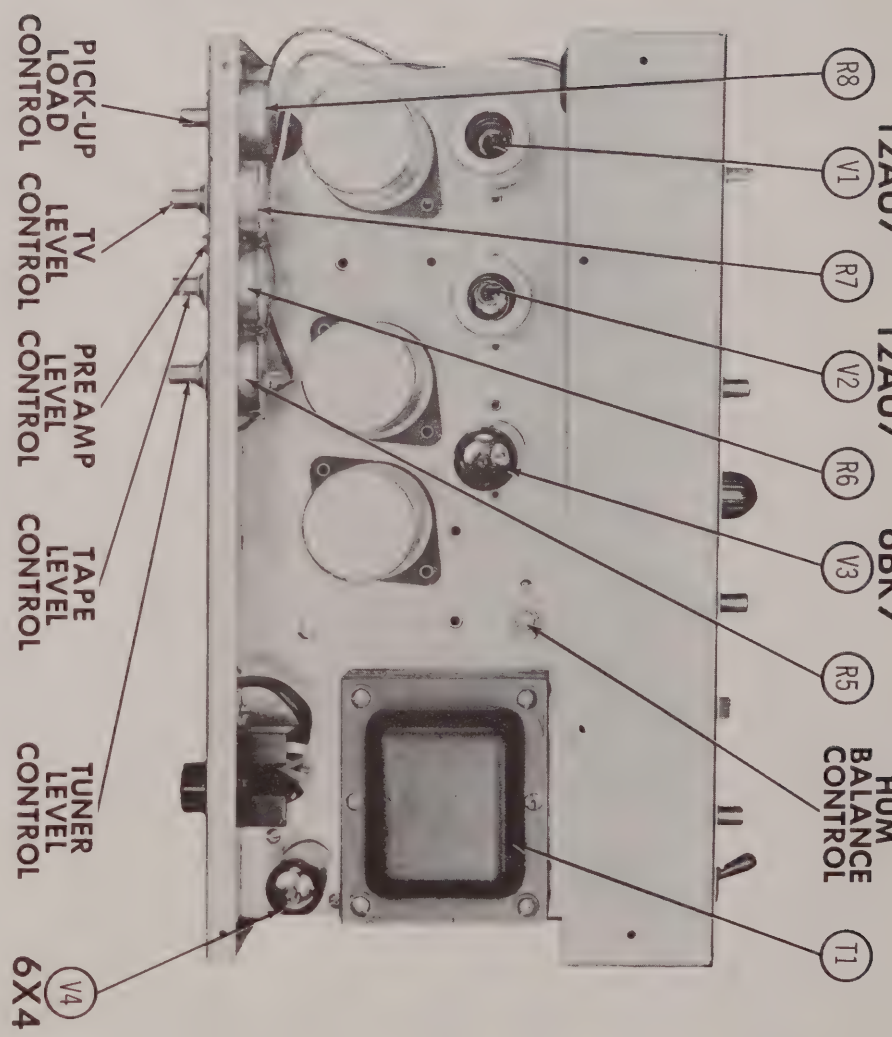
ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	H. H. SCOTT PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■10	350					
B	▲10	350					
C	300	25					
D	▲300	25					
C2A	▲10	450			TM-4092	Q-295	
B	■10	450					
C	▲25	25					
D	25	25					
C3A	■10	450			TM-4092	Q-295	
B	▲10	450					
C	▲25	25					
D	25	25					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	H. H. SCOTT PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C4	100	500		TCZ-100	NPO-337-101	MC235	
C5	.022	400		DF-203	817-02	PT4122	
C6	.022	400		DF-203	817-02	PT4122	
C7	.0015	400		D6-152	811-152	UC-5212	
C8	470	500					
C9	680	500					
C10	680	500					
C11	62	500		TCZ-62	NPO-337-620		
C12	330	500					
C13	220	500		TCZ-220	NPO-335-221		
C14	.047	400		DF-503		PT4147	
C15	.0012	400		D6-122	811-122	UC-5212	
C16	.0012	400		D6-122	811-122	UC-5212	
C17	10	500		TCZ-10	NPOA-100		
C18	.047	400		DF-503		PT4147	
C19	.047	400		DF-503		PT4147	
C20	100	500		TCZ-100	NPOA-337-101	MC235	
C21	.01	400		D6-103	GP1K-333-103	PT411	
C22	220	500		TCZ-220	NPO-335-221		
C23	.015	400		D16-153		PT6115	
C24	470	500					
C25	.022	400		DF-203	817-02	PT4122	
C26	47	500		TCZ-47	NPO-338-470	ZT-5447	
C27	.022	400		DF-203	817-02	PT4122	
C28	.01	400		D6-103	GP1K-333-103	PT411	
C29	.022	400		DF-203	817-02	PT4122	
C30	.1	400		DF-104		PT401	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	H. H. SCOTT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Bass (Tap at 600KΩ)
R2	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Treble (Tap at 600KΩ)
R3A	500KΩ	½	RCV-500KTT-3F	Q18-133XX		ABT-160	UDT-283	Loudness (Tap at 100K and 275KΩ)
B	Shaft		Not Req.	Not Req.		AK-3	Not Req.	Attach to R3A.
R4A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Preamp. Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R4A.
R5A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Tuner Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R5A.
R6A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Tape Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R6A.
R7A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	T. V. Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R7A.
R8A	100KΩ	½	RCV-100K-3S	Q11-128	A47-100K-S	AB-40	U-41	Pickup Load
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A.
R9A	500Ω	½	RCV-500-S	Q11-103	A47-500-S	AB-4	U-2	Hum Balance
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R9A.

RESISTORS

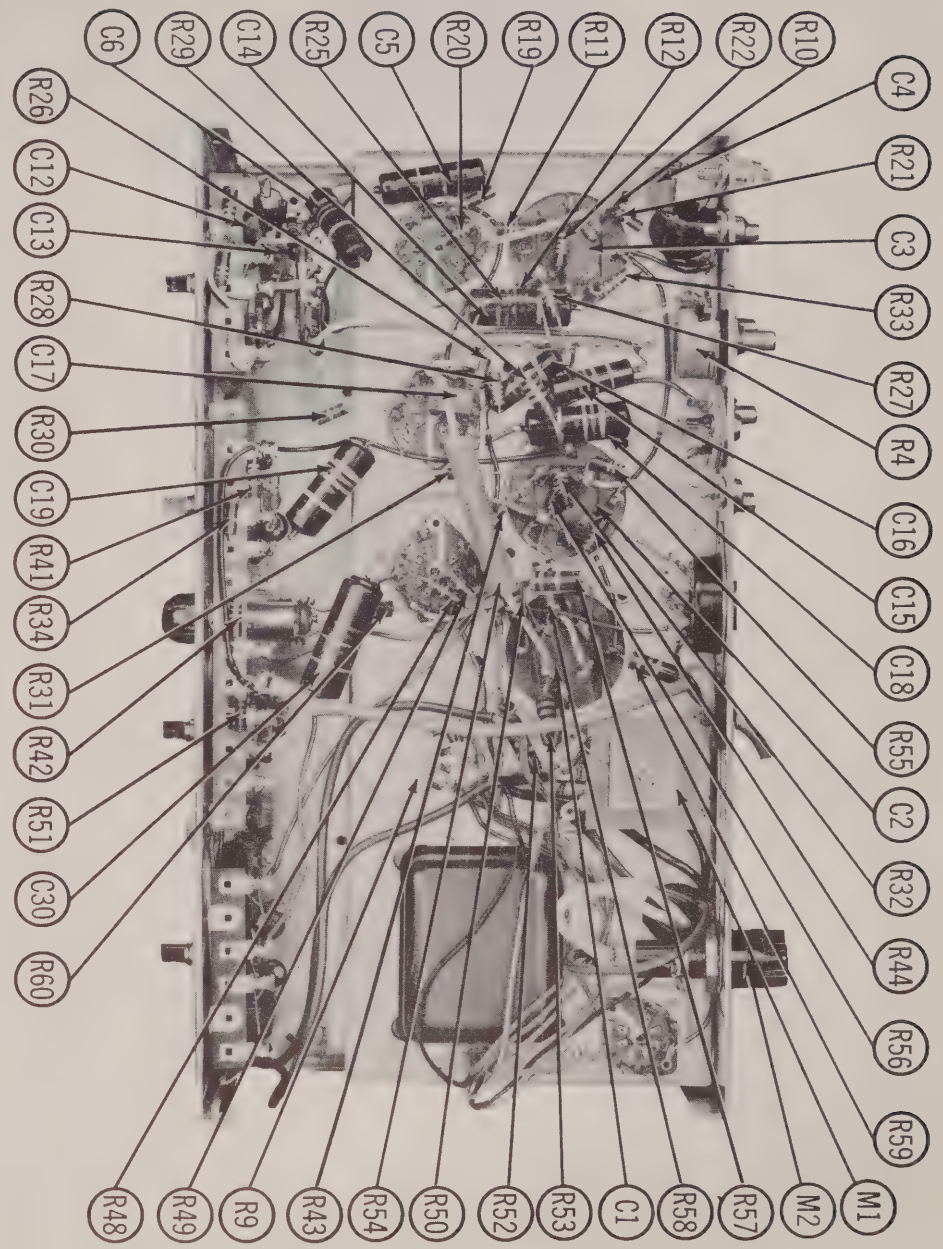
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	H. H. SCOTT PART No.	IRC PART No.	
R10	4700Ω	½		BTS-4700	
R11	270KΩ	½		BTS-270K	
R12	2700Ω	½		BTS-2700	
R13	68KΩ	½		BTS-68K	
R14	470KΩ	½		BTS-470K	
R15	22Meg	½		BTS-22Meg	
R16	3.3Meg	½		BTS-3.3Meg	
R17	820KΩ	½		BTS-820K	
R18	1.5Meg	½		BTS-1.5Meg	
R19	1Meg	½		BTS-1Meg	
R20	270KΩ	½		BTS-270K	
R21	2700Ω	½		BTS-2700	
R22	47KΩ	½		BTS-47K	
R23	680KΩ	½		BTS-680K	
R24	220KΩ	½		BTS-220K	
R25	2.2Meg	½		BTS-2.2Meg	
R26	2.2Meg	½		BTS-2.2Meg	
R27	33KΩ	½		BTS-33K	
R28	820Ω	½		BTS-820	
R29	47KΩ	1		BTA-47K	
R30	1Meg	½		BTS-1Meg	
R31	100KΩ	½		BTS-100K	
R32	33KΩ	½		BTS-33K	
R33	4700Ω	½		BTS-4700	
R34	1Meg	½		BTS-1Meg	
R35	330KΩ	½		BTS-330K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	H. H. SCOTT PART No.	IRC PART No.	
R36	1Meg	½		BTS-1Meg	
R37	33KΩ	½		BTS-33K	
R38	1Meg	½		BTS-1Meg	
R39	10KΩ	½		BTS-10K	
R40	33KΩ	½		BTS-33K	
R41	33KΩ	½		BTS-33K	
R42	680KΩ	½		BTS-680K	
R43	100KΩ	½		BTS-100K	
R44	2200Ω	½		BTS-2200	
R45	330KΩ	½		BTS-330K	
R46	47KΩ	½		BTS-47K	
R47	100KΩ	½		BTS-100K	
R48	2.2Meg	½		BTS-2.2Meg	
R49	1200Ω	½		BTS-1200	
R50	47KΩ	1		BTA-47K	
R51	2.2Meg	½		BTS-2.2Meg	
R52	2.7Ω 5%	1			
R53	2.7Ω 5%	1			
R54	40Ω	7		1 3/4A-40	
R55	47KΩ	½		BTS-47K	
R56	470KΩ	½		BTS-470K	
R57	3300Ω	1		BTA-3300	
R58	3300Ω	1		BTA-3300	
R59	2.7Ω 5%	1			
R60	47Ω	½		BW½-47	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	H. H. SCOTT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ .25A	495VCT .010ADC	25VAC .290ADC	6.3VAC ⓐ 1A						

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	H. H. SCOTT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.290ADC		1016	C1B		304B		

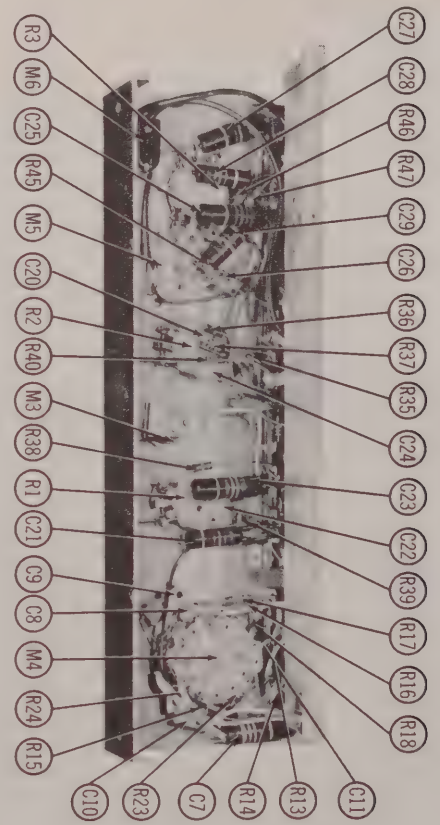
FUSES

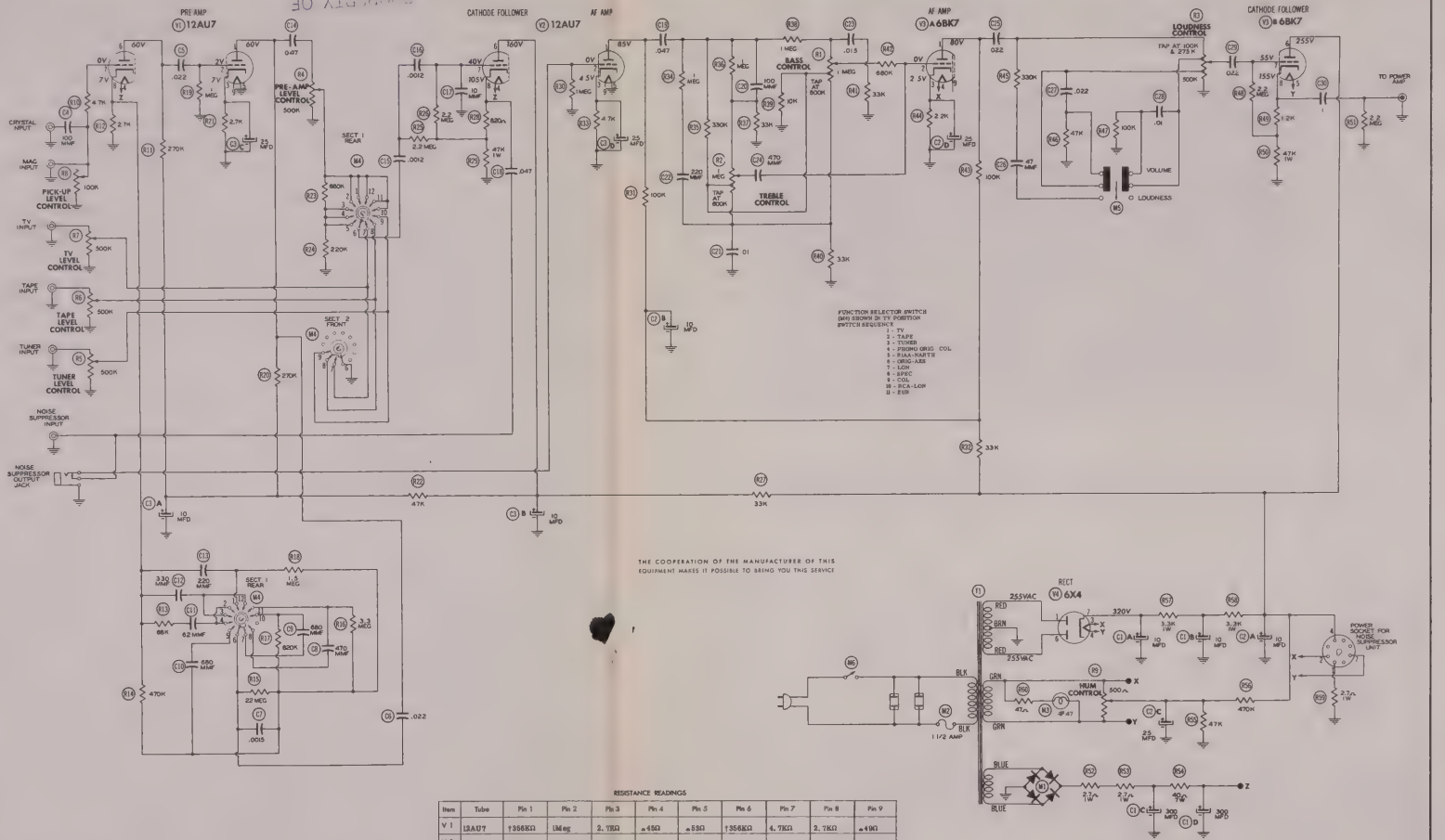
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			H. H. SCOTT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	½A 250V			312.500 (3AG½A)	342003	AGC½	HKP

MISCELLANEOUS

ITEM No.	PART NAME	H. H. SCOTT PART No.	NOTES
M3	Panel Light		#47
M4A	Switch		Input Selector
B	Switch		Record Compensation
M5	Switch		Volume-Loudness (DPDT-Slidetype)
M6	Switch		Power (On-Off)

FRONT APRON-REAR VIEW





RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AU7	†366KΩ	1Meg	2. 7KΩ	▲45Ω	▲53Ω	†356KΩ	4. 7KΩ	2. 7KΩ	▲49Ω
V 2	12AU7	†139KΩ	1Meg	4. 7KΩ	▲45Ω	▲53Ω	†39. 6KΩ	2. 2Meg	47. 8KΩ	▲49Ω
V 3	6BK7	†139KΩ	713KΩ	2. 2KΩ	47KΩ	47KΩ	†8. 6KΩ	2. 2Meg	48. 2KΩ	NC
V 4	6X4	400Ω	NC	47KΩ	47KΩ	NC	400Ω	30KΩ		

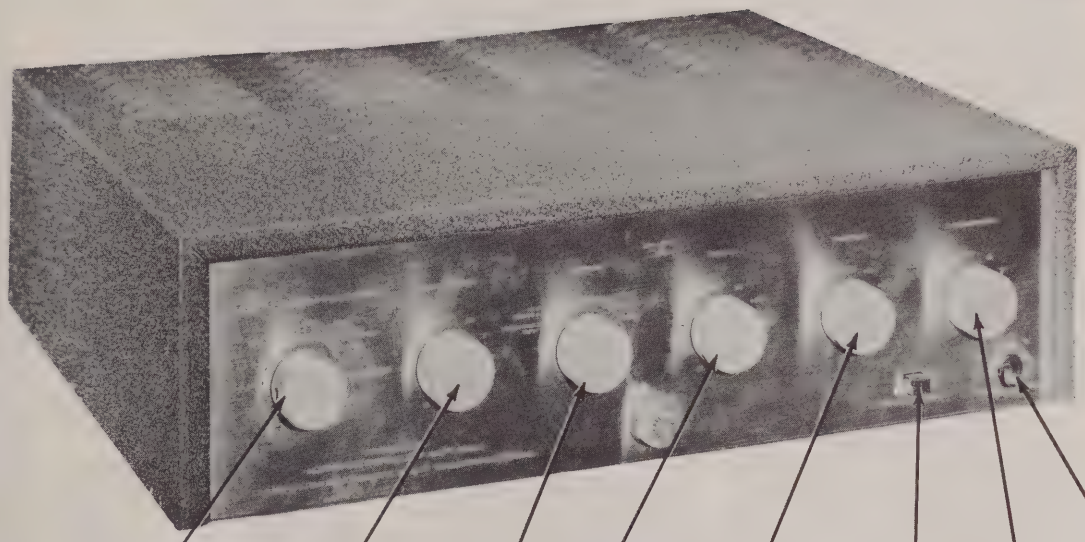
▲MEASURED FROM OUTPUT OF M1.
†MEASURED FROM PIN 7 OF V4.
ALL MEASUREMENTS WITH SELECTOR SWITCH IN MAXIMUM COUNTER-CLOCKWISE POSITION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

© Howard W. Sams & Co., Inc. 1955

PROPERTY OF
L. F. BLANKENSHIP
3924 MAGNOLIA ST.
DENVER, COLORADO

H. H. SCOTT
MODEL 210C

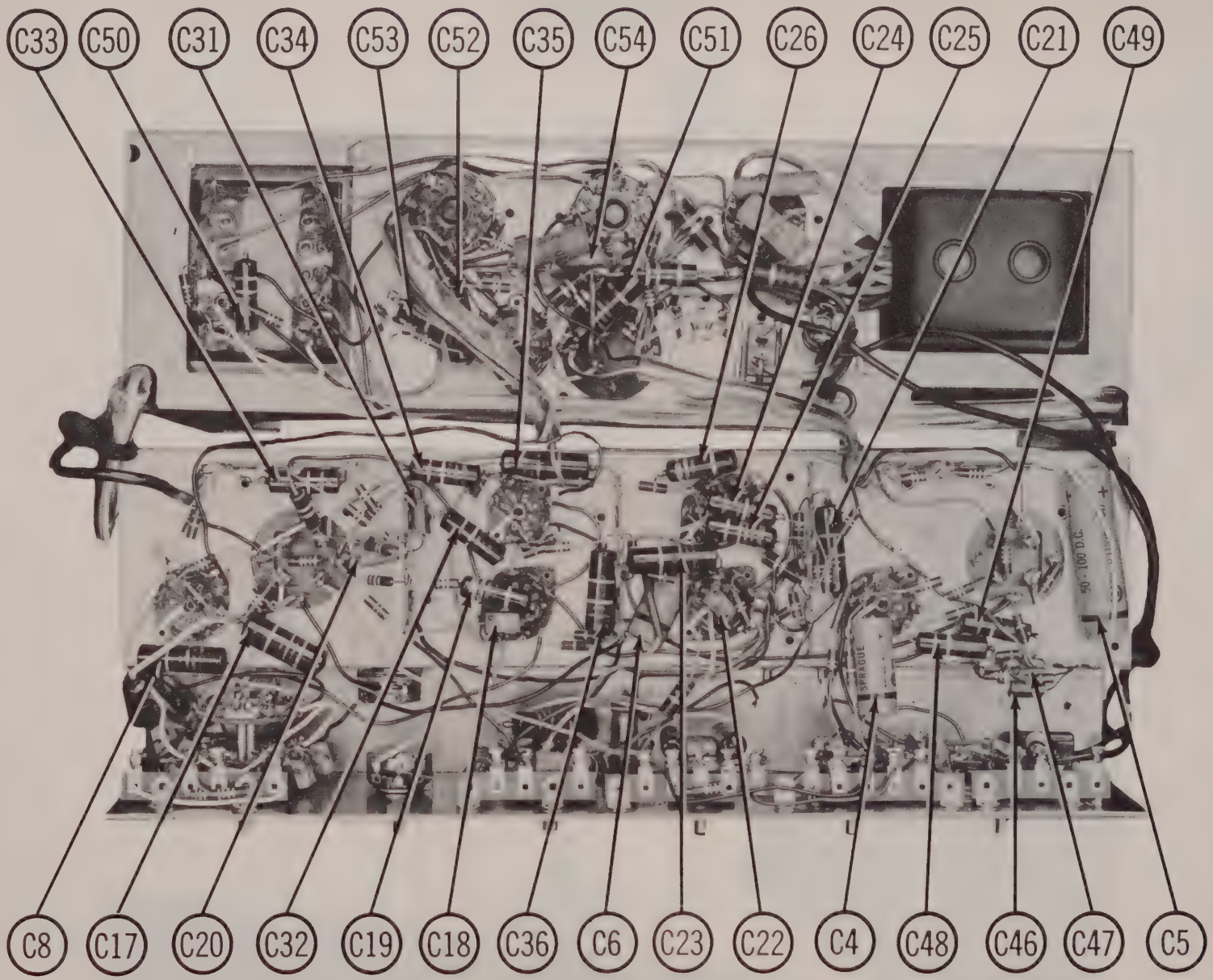


H. H. SCOTT
MODEL 210C

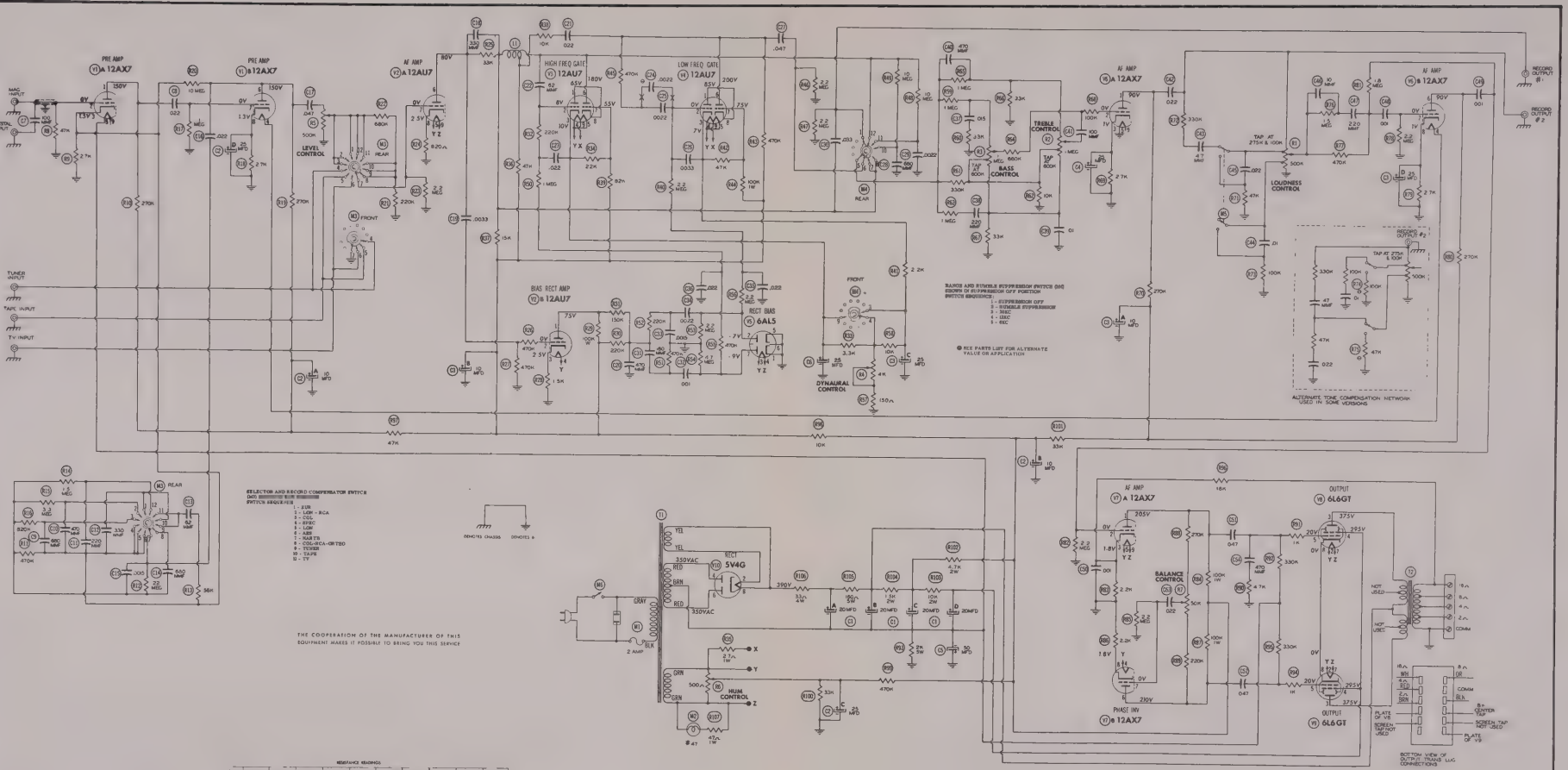
TRADE NAME	H. H. Scott Model 210C
MANUFACTURER	Hermon Hosmer Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.
TYPE SET	AC Operated 2 Channel Audio Amplifier With Equalizer
TUBES	Ten
POWER SUPPLY	100-120 Volts AC-50/60 Cycles
RATING	1.13 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



PRE-AMP. & POWER AMP. CHASSIS-BOTTOM VIEW-CAPACITOR IDENT.



RESISTANCE READINGS

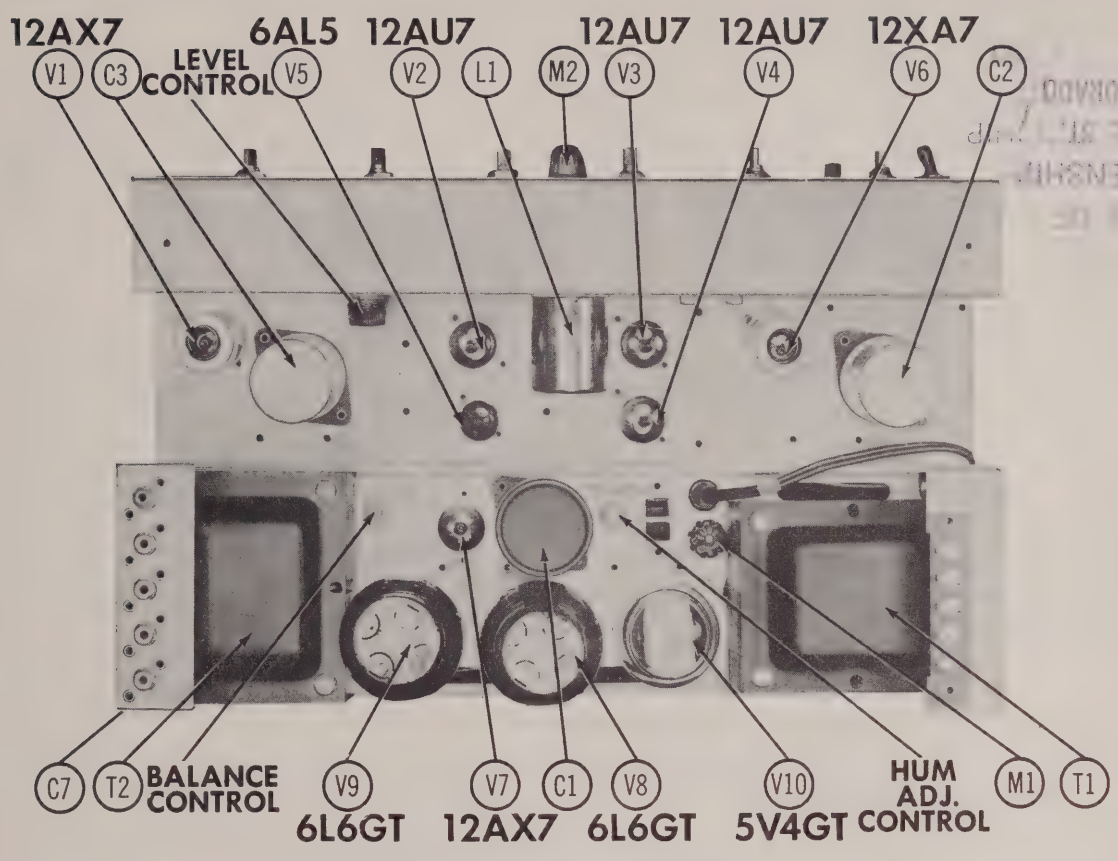
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	137KΩ	470Ω	2.1KΩ	0Ω	.5Ω	137KΩ	1Meg	2.1KΩ	0Ω
V 2	12AU7	105KΩ	1Meg	1.5KΩ	680Ω	330Ω	105KΩ	2.2Meg	930Ω	330Ω
V 3	12AU7	INF	INF	1KΩ	330Ω	330Ω	430KΩ	330Ω	INF	330Ω
V 4	12AU7	INF	4Meg	2.1KΩ	330Ω	330Ω	1300KΩ	330Ω	INF	330Ω
V 5	6AL5	0Ω	2.2Meg	330Ω	330Ω	0Ω	0Ω	4Meg		
V 6	12AX7	135KΩ	500Ω	2.1KΩ	0Ω	0Ω	135KΩ	1Meg	2.1KΩ	0Ω
V 7	12AX7	130KΩ	2.2Meg	2.2KΩ	330Ω	330Ω	130KΩ	2.2Meg	2.2KΩ	330Ω
V 8	6L6GT	0Ω	330Ω	900Ω	420Ω	330Ω	330Ω	330Ω	0Ω	
V 9	6L6GT	0Ω	330Ω	900Ω	420Ω	330Ω	330Ω	330Ω	0Ω	
V 10	5V4GT	INF	2.1KΩ	INF	135Ω	420Ω	130Ω	INF	2.2KΩ	

MEASURED FROM PIN #3 OF V10.

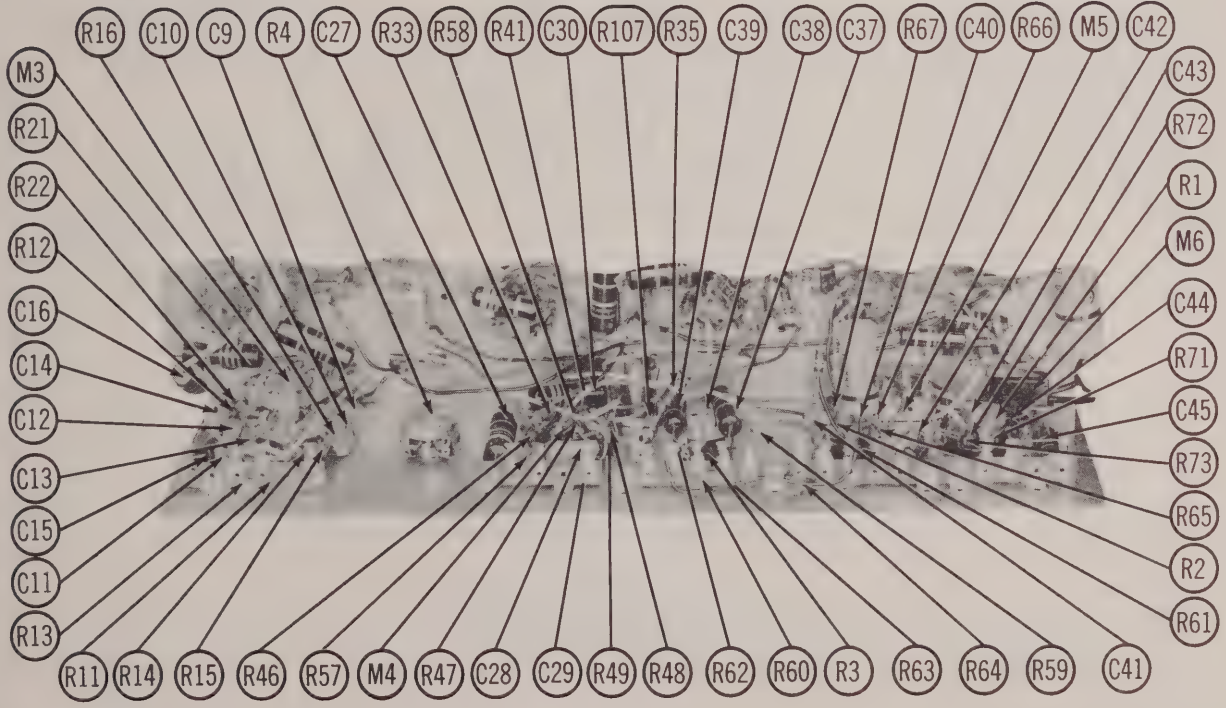
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom view.
3. Measured values are from socket pin to common negative.
4. Tube complement could vary with model for voltage readings.
5. Nominal line voltage was maintained which makes possible a variation of ± 10% in voltage and resistance readings.
6. All controls at minimum, proper signal input connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

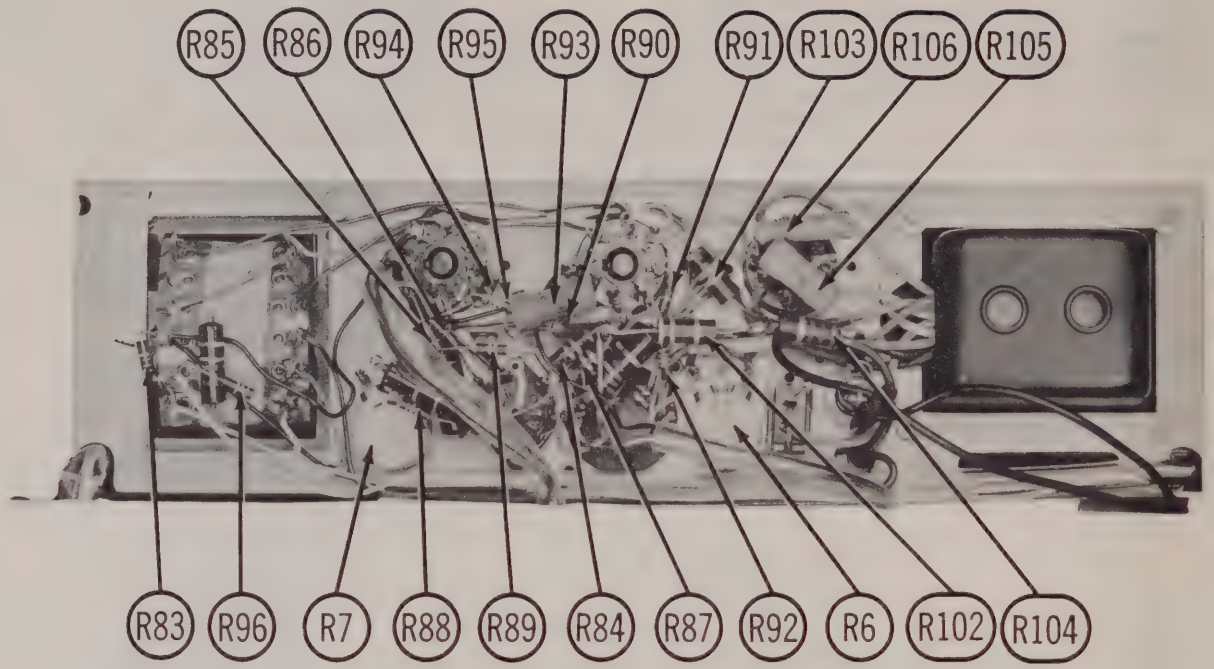
298-11



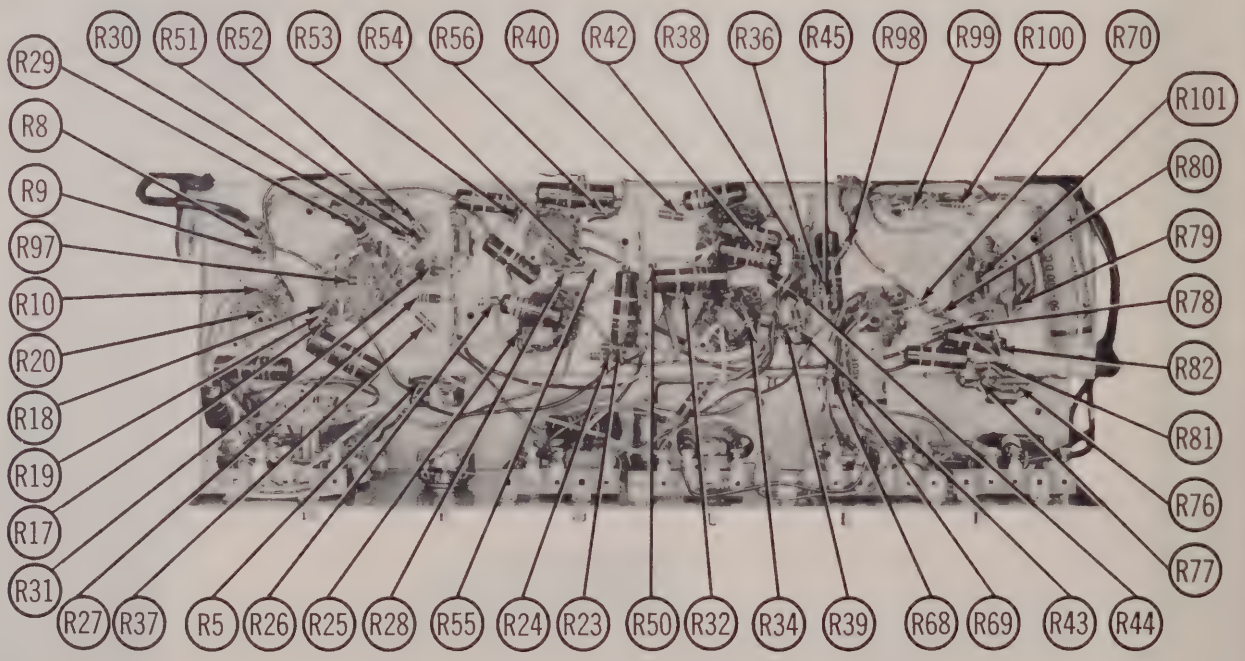
CHASSIS TOP VIEW



PRE-AMP. FRONT PANEL-REAR VIEW



POWER AMP. CHASSIS-BOTTOM VIEW-RESISTOR IDENT.



PRE-AMP. CHASSIS-BOTTOM VIEW-RESISTOR IDENT.

PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: H. H. Scott PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Preamp.	12AX7	12AX7	9A	
V2	AF Amp. - Bias Rectifier Amp.	12AU7	12AU7	9A	
V3	HF Noise Gate	12AU7	12AU7	9A	
V4	LF Noise Gate	12AU7	12AU7	9A	
V5	Bias Rectifier	6AL5	6AL5	6BT	
V6	AF Amplifier	12AX7	12AX7	9A	
V7	AF Amp. - Phase Inverter	12AX7	12AX7	9A	
V8	Output	6L6GT	6L6GT	7S	
V9	Output	6L6GT	6L6GT	7S	
V10	Rectifier	5V4GT	5V4GT	5L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H. H. SCOTT PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	▲20	475		FP475	TM-303020-500 / TD-20-475		
B	■20	475					
C	▲20	475					
D	20	475					
C2A	▲10	450			TM-3086 / TD-25-25	Q295	
B	■10	450					
C	▲25	25					
D	25	25					
C3A	▲10	450			TM-3086 / TD-25-25	Q295	
B	■10	450					
C	▲25	25					
D	25	25					
C4	25	25		TC26	TD-25-25	FM-0225	
C5	50	100		TC49	TD-50-150	FM-1550	
C6	25	25		TC26	TD-25-25	FM-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H. H. SCOTT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C7	100	500				MCB230	
C8	.022	400				PT4122	
C9	680	500					
C10	470	500					
C11	220	500					
C12	330	500					
C13	62	500					
C14	680	500					
C15	.0015	400		D6-152	GP2L-152	PT4215	
C16	.022	400				PT4122	
C17	.047	400		DF-503		PT4147	
C18	330	500					
C19	.0033	400		D6-332	GP2-333-332	PT6233	
C20	470	500					
C21	.022	400				PT4122	
C22	62	500					
C23	.022	400				PT4122	
C24	.0022	400					Note 1
C25	.0022	400					Note 1
C26	.0033	400		D6-332	GP2-333-332	PT4233	
C27	.047	400		DF-503		PT4147	
C28	680	500					
C29	.0022	400					
C30	.033	400		D6-331	GP2-333-331	PT4133	
C31	180	500					
C32	.001	400					
C33	.0015	400					
C34	.0022	400					
C35	.022	400				PT4122	

PARTS LIST AND DESCRIPTIONS (Continued)
CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H.H. SCOTT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C36	.022	400				PT4122	
C37	.015	400				PT4115	
C38	220	500					
C39	.01	400		D6-103	GP2-333-103	PT411	
C40	470	500					
C41	100	500				MCB230	
C42	.022	400				PT4122	
C43	47	500					
C44	.01	400		D6-103	GP2-333-103	PT411	
C45	.022	400				PT4122	
C46	10	500					
C47	220	500					
C48	.001	400					
C49	.001	400					
C50	.001	400					
C51	.047	400		DF-503		PT4147	
C52	.047	400		DF-503		PT4147	
C53	.022	400				PT4122	
C54	470	500					

Note 1. Some versions may use a .0047MF in place of C24 and C25 combined.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	RCV-500KTT-3F	Q18-133XX		ABT-160	UDT-283	Loudness-tapped @ 275KΩ and 100KΩ
B	Shaft		Not Req.	Not Req.		AK-3	Not Req.	Attach to R1A
R2	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Treble-tapped @ 600KΩ
R3	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Bass-tapped @ 600KΩ
R4	4000Ω	½	RCV-4000-3F	Q17-114		B-12		Dynaural
R5A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R5A
R6A	500Ω	½	RCV-500-S	Q11-103	A47-500-S	AB-4	U-2	Hum Adjust
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	50KΩ	½	RCV-50K-S	Q11-123	A47-50K-S	AB-31	SU-35	Balance
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R7A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R8	47KΩ	½		BTS-47K	
R9	2700Ω	½		BTS-2700	
R10	270KΩ	½		BTS-270K	
R11	470KΩ	½		BTS-470K	
R12	22Meg	½		BTS-22Meg	
R13	56KΩ	½		BTS-56K	
R14	1.5Meg	½		BTS-1.5Meg	
R15	3.3Meg	½		BTS-3.3Meg	
R16	820KΩ	½		BTS-820K	
R17	1Meg	½		BTS-1Meg	
R18	2700Ω	½		BTS-2700	
R19	270KΩ	½		BTS-270K	
R20	10Meg	½		BTS-10Meg	
R21	220KΩ	½		BTS-220K	
R22	680KΩ	½		BTS-680K	
R23	2.2Meg	½		BTS-2.2Meg	
R24	820Ω	½		BTS-820	
R25	33KΩ	½		BTS-33K	
R26	470KΩ	½		BTS-470K	
R27	470KΩ	½		BTS-470K	
R28	1500Ω	½		BTS-1500	
R29	100KΩ	1		BTA-100K	
R30	220KΩ	½		BTS-220K	
R31	150KΩ	½		BTS-150K	
R32	220KΩ	½		BTS-220K	
R33	3300Ω	½		BTS-3300	
R34	22KΩ	½		BTS-22K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H.Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R35	2.7Ω	1			
R35	47KΩ	½		BTS-47K	
R37	15KΩ	½		BTS-15K	
R38	10KΩ	½		BTS-10K	
R39	82KΩ	½		BTS-82K	
R40	2.2Meg	½		BTS-2.2Meg	
R41	2200Ω	½		BTS-2200	
R42	47KΩ	½		BTS-47K	
R43	470KΩ	½		BTS-470K	
R44	100KΩ	1		BTA-100K	
R45	470KΩ	½		BTS-470K	
R46	2.2Meg	½		BTS-2.2Meg	
R47	2.2Meg	½		BTS-2.2Meg	
R48	10Meg	½		BTS-10Meg	
R49	10Meg	½		BTS-10Meg	
R50	1Meg	½		BTS-1Meg	
R51	470KΩ	½		BTS-470K	
R52	220KΩ	½		BTS-220K	
R53	2.2Meg	½		BTS-2.2Meg	
R54	4.7Meg	½		BTS-4.7Meg	
R55	470KΩ	½		BTS-470K	
R56	2.2Meg	½		BTS-2.2Meg	
R57	150Ω	½		BTS-150	
R58	10KΩ	½		BTS-10K	
R59	1Meg	½		BTS-1Meg	
R60	33KΩ	½		BTS-33K	
R61	330KΩ	½		BTS-330K	

DENVER

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	H.H. Scott PART No.	IRC PART No.	
R62	10KΩ	½		BTS-10K	
R63	1Meg	½		BTS-1Meg	
R64	680KΩ	½		BTS-680K	
R65	1Meg	½		BTS-1Meg	
R66	33KΩ	½		BTS-33K	
R67	33KΩ	½		BTS-33K	
R68	10KΩ	½		BTS-10K	
R69	2700Ω	½		BTS-2700	
R70	270KΩ	½		BTS-270K	
R71	47KΩ	½		BTS-47K	
R72	330KΩ	½		BTS-330K	
R73	100KΩ	½		BTS-100K	
R74	100KΩ	½		BTS-100K	Note 1
R75	47KΩ	½		BTS-47K	Note 1
R76	1.5Meg	½		BTS-1.5Meg	
R77	470KΩ	½		BTS-470K	
R78	2.2Meg	½		BTS-2.2Meg	
R79	2700Ω	½		BTS-2700	
R80	270KΩ	½		BTS-270K	
R81	1.8Meg	½		BTS-1.8Meg	
R82	2.2Meg	½		BTS-2.2Meg	
R83	2200Ω	½		BTS-2200	
R84	100KΩ	1		BTA-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	H.H. Scott PART No.	IRC PART No.	
R85	2.2Meg	½		BTS-2.2Meg	
R86	2200Ω	½		BTS-2200	
R87	100KΩ	1		BTA-100K	
R88	270KΩ	½		BTS-270K	
R89	220KΩ	½		BTS-220K	
R90	4700Ω	½		BTS-4700	
R91	1000Ω	½		BTS-1000	
R92	330KΩ	½		BTS-330K	
R93	2000Ω	5		1 3/4A-2000	
R94	1000Ω	½		BTS-1000	
R95	330KΩ	½		BTS-330K	
R96	18KΩ	½		BTS-18K	
R97	47KΩ	½		BTS-47K	
R98	10KΩ	½		BTS-10K	
R99	470KΩ	½		BTS-470K	
R100	33KΩ	½		BTS-33K	
R101	33KΩ	½		BTS-33K	
R102	4700Ω	2		BTB-4700	
R103	10KΩ	2		BTB-10K	
R104	1500Ω	2		BTB-1500	
R105	160Ω	5			
R106	33Ω	4			
R107	47Ω	1			

Note 1. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	H.H. SCOTT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @1.13A	750VCT .160ADC	5VAC @3A	6.3VAC @3.5A			P-2954			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	H.H. SCOTT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1.42KΩ CT Tap @ 79Ω RES (Not Used)	16Ω Tap @ 8Ω, @ 4Ω, @ 2Ω							

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	H.H. SCOTT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Tone Choke	9Ω						Tapped @ 6.7Ω.

CHASSIS—BOTTOM VIEW

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			H.H. SCOTT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	2A 125V			313002. (3AG S/B 2A)	342001	MDL2	HKP

MISCELLANEOUS

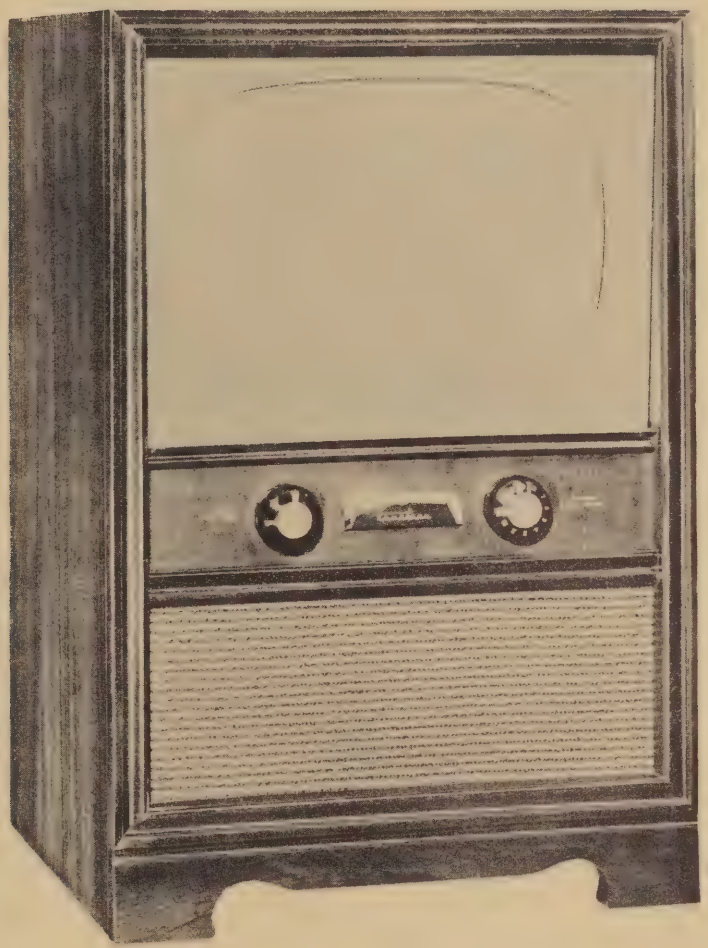
ITEM No.	PART NAME	H.H. SCOTT PART No.	NOTES
M2	Pilot Light		#47 Bayonet
M3	Switch		Selector & Record Compensator-(Rotary-Wafer Type)
M4	Switch		Range & Rumble Suppression-(Rotary-Wafer Type)
M5	Switch		Volume-Loudness-(DPDT-Slidetype)
M6	Switch		On-Off-(Power)

PROPERTY OF
[illegible]SHIP
[illegible] MEADE ST.
[illegible]VER, COLORADO

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 2D1430D

TRUETONE MODELS
2D1430D, E, 2D2433B

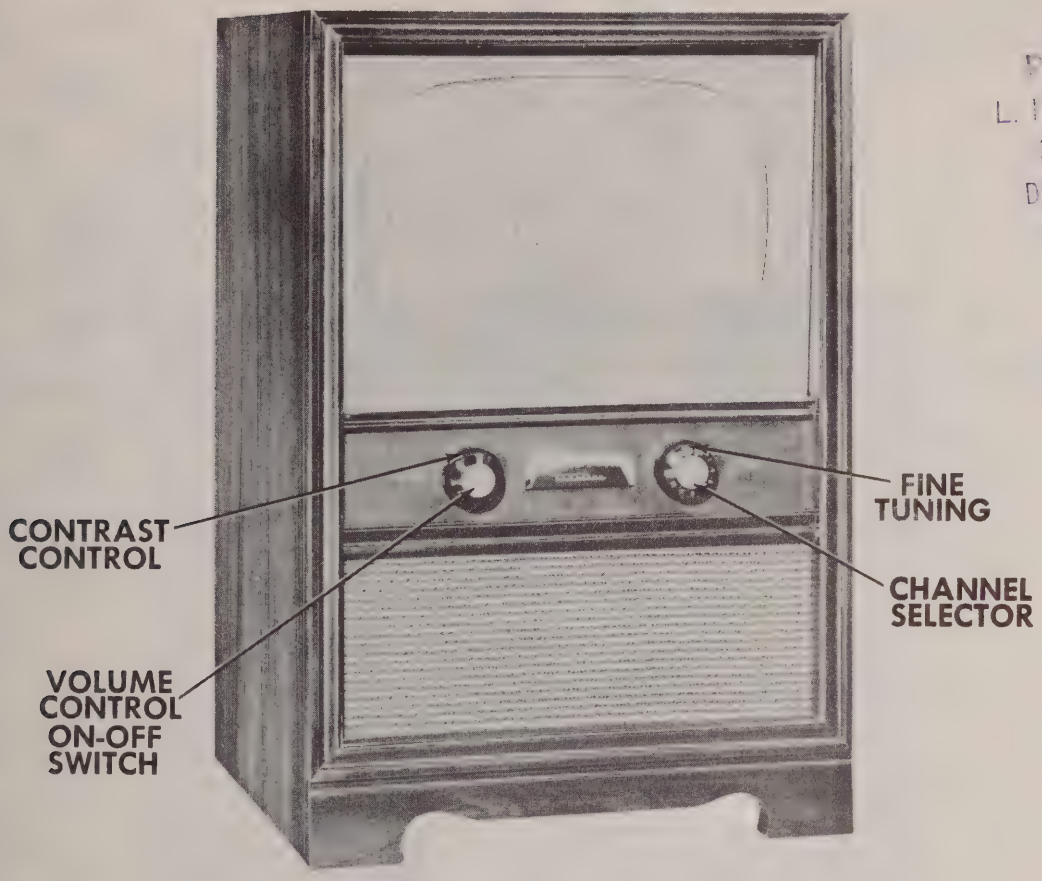
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PHOTOFACT* Folder
*TRADE MARK

TRUETONE MODELS 2D1430D, E, 2D2433B

PROPERTY OF
L. F. CLARKENSHIP
[illegible] TRADE ST.
DENVER, COLORADO



TRUETONE MODEL 2D1430D

TRADE NAME	Truetone Models 2D1430D, 2D1430E, 2D2433B
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Television Receiver
TUBES	Twenty-three
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.7 Amp. @ 117 Volts AC
TUNING RANGE–	Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

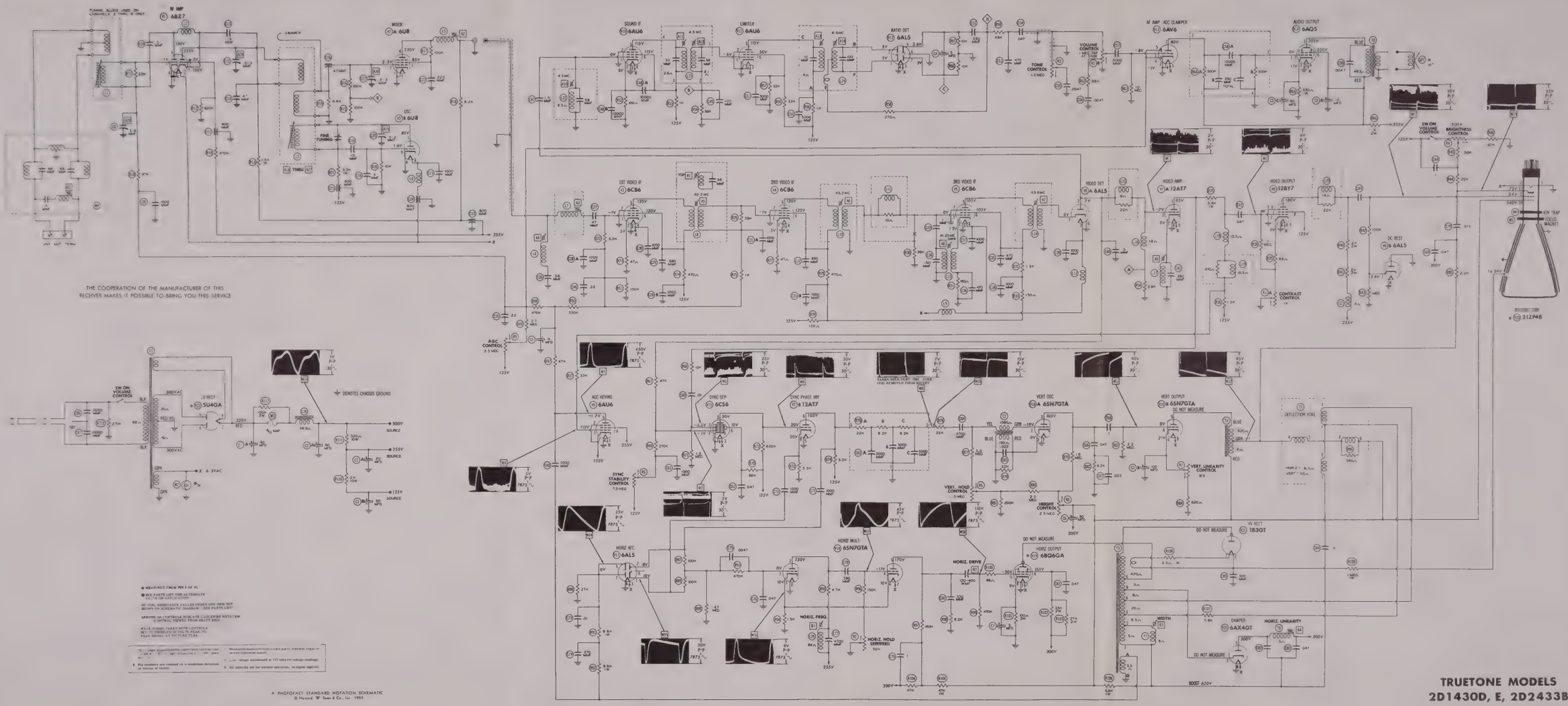
INDEX

Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 13 thru 16
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 17
Resistor Identification 19, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 10
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

TRUETONE MODELS 2D1430D, E, 2D2433B

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



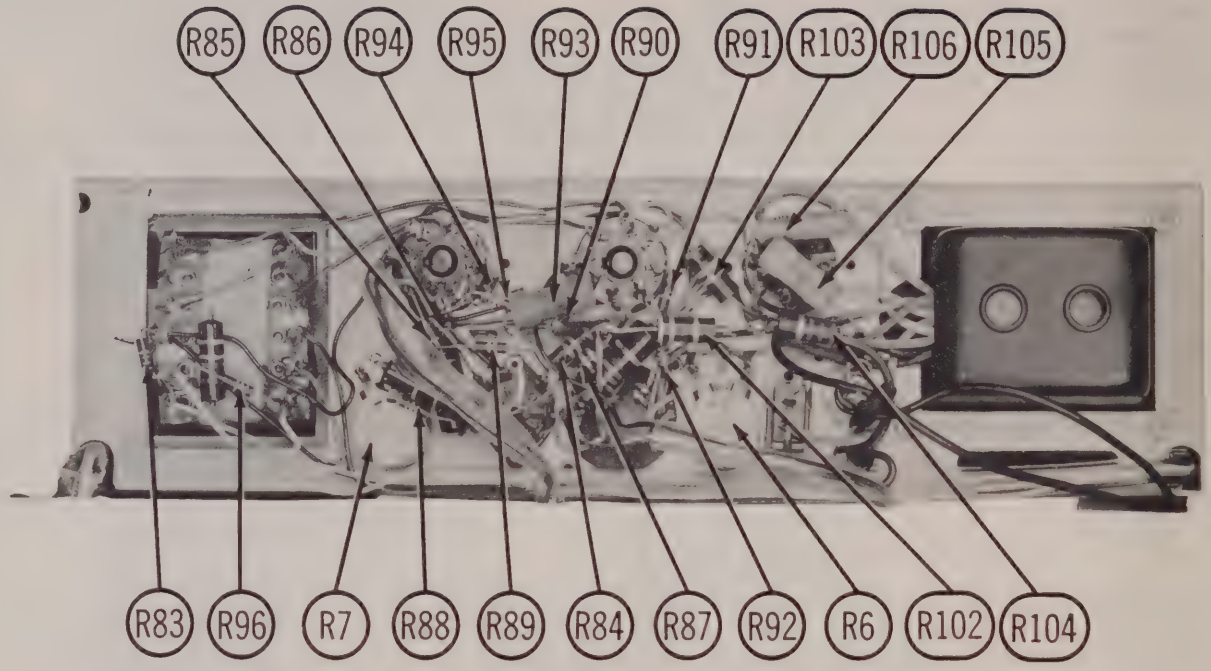
TRUETONE MODELS
2D1430D, E, 2D2433B

TRUETONE MODELS
2D1430D, E, 2D2433B

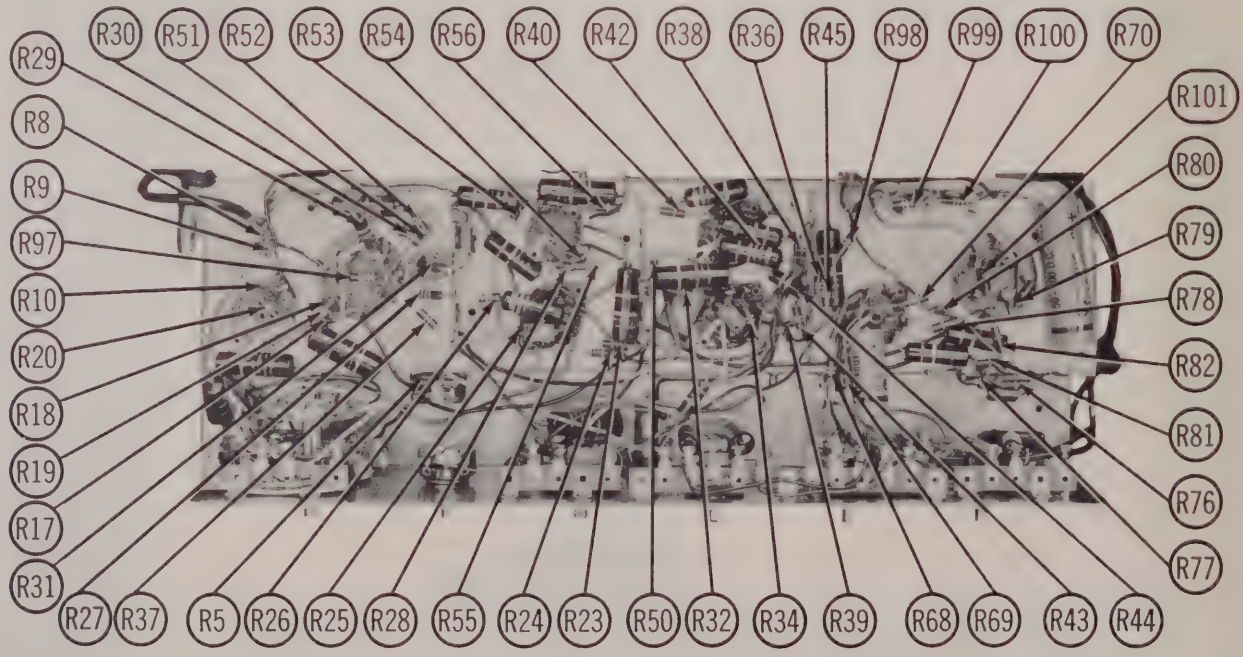
PROPERTY OF
L. F. MCCARTHY
3018 WEADE ST.
DENVER, COLORADO

CHASSIS TOP VIEW

TRUETONE MODELS
2D1430D, E, 2D2433B



POWER AMP. CHASSIS-BOTTOM VIEW-RESISTOR IDENT.



PRE-AMP. CHASSIS-BOTTOM VIEW-RESISTOR IDENT.

PARTS LIST AND DESCRIPTIONS
TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: H. H. Scott PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Preamp.	12AX7	12AX7	9A	
V2	AF Amp. - Bias Rectifier Amp.	12AU7	12AU7	9A	
V3	HF Noise Gate	12AU7	12AU7	9A	
V4	LF Noise Gate	12AU7	12AU7	9A	
V5	Bias Rectifier	6AL5	6AL5	6BT	
V6	AF Amplifier	12AX7	12AX7	9A	
V7	AF Amp. - Phase Inverter	12AX7	12AX7	9A	
V8	Output	6L6GT	6L6GT	7S	
V9	Output	6L6GT	6L6GT	7S	
V10	Rectifier	5V4GT	5V4GT	5L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H. H. SCOTT PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	NOTES
C1A	▲20	475		FP475	TM-303020-500 / TD-20-475		
B	■20	475					
C	▲20	475					
D	20	475					
C2A	▲10	450			TM-3086 / TD-25-25	Q295	
B	■10	450					
C	▲25	25					
D	25	25					
C3A	▲10	450			TM-3086 / TD-25-25	Q295	
B	■10	450					
C	▲25	25					
D	25	25					
C4	25	25		TC26	TD-25-25	FM-0225	
C5	50	100		TC49	TD-50-150	FM-1550	
C6	25	25		TC26	TD-25-25	FM-0225	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H. H. SCOTT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C7	100	500				MCB230	
C8	.022	400				PT4122	
C9	680	500					
C10	470	500					
C11	220	500					
C12	330	500					
C13	62	500					
C14	680	500					
C15	.0015	400		D6-152	GP2L-152	PT4215	
C16	.022	400				PT4122	
C17	.047	400		DF-503		PT4147	
C18	330	500					
C19	.0033	400		D6-332	GP2-333-332	PT6233	
C20	470	500					
C21	.022	400				PT4122	
C22	62	500					
C23	.022	400				PT4122	
C24	.0022	400					Note 1
C25	.0022	400					Note 1
C26	.0033	400		D6-332	GP2-333-332	PT4233	
C27	.047	400		DF-503		PT4147	
C28	680	500					
C29	.0022	400					
C30	.033	400		D6-331	GP2-333-331	PT4133	
C31	180	500					
C32	.001	400					
C33	.0015	400					
C34	.0022	400					
C35	.022	400				PT4122	

PARTS LIST AND DESCRIPTIONS (Continued)
CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: H.H. SCOTT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	NOTES
C36	.022	400				PT4122	
C37	.015	400				PT4115	
C38	220	500					
C39	.01	400		D6-103	GP2-333-103	PT411	
C40	470	500					
C41	100	500				MCB230	
C42	.022	400				PT4122	
C43	47	500					
C44	.01	400		D6-103	GP2-333-103	PT411	
C45	.022	400				PT4122	
C46	10	500					
C47	220	500					
C48	.001	400					
C49	.001	400					
C50	.001	400					
C51	.047	400		DF-503		PT4147	
C52	.047	400		DF-503		PT4147	
C53	.022	400				PT4122	
C54	470	500					

Note 1. Some versions may use a .0047MF in place of C24 and C25 combined.

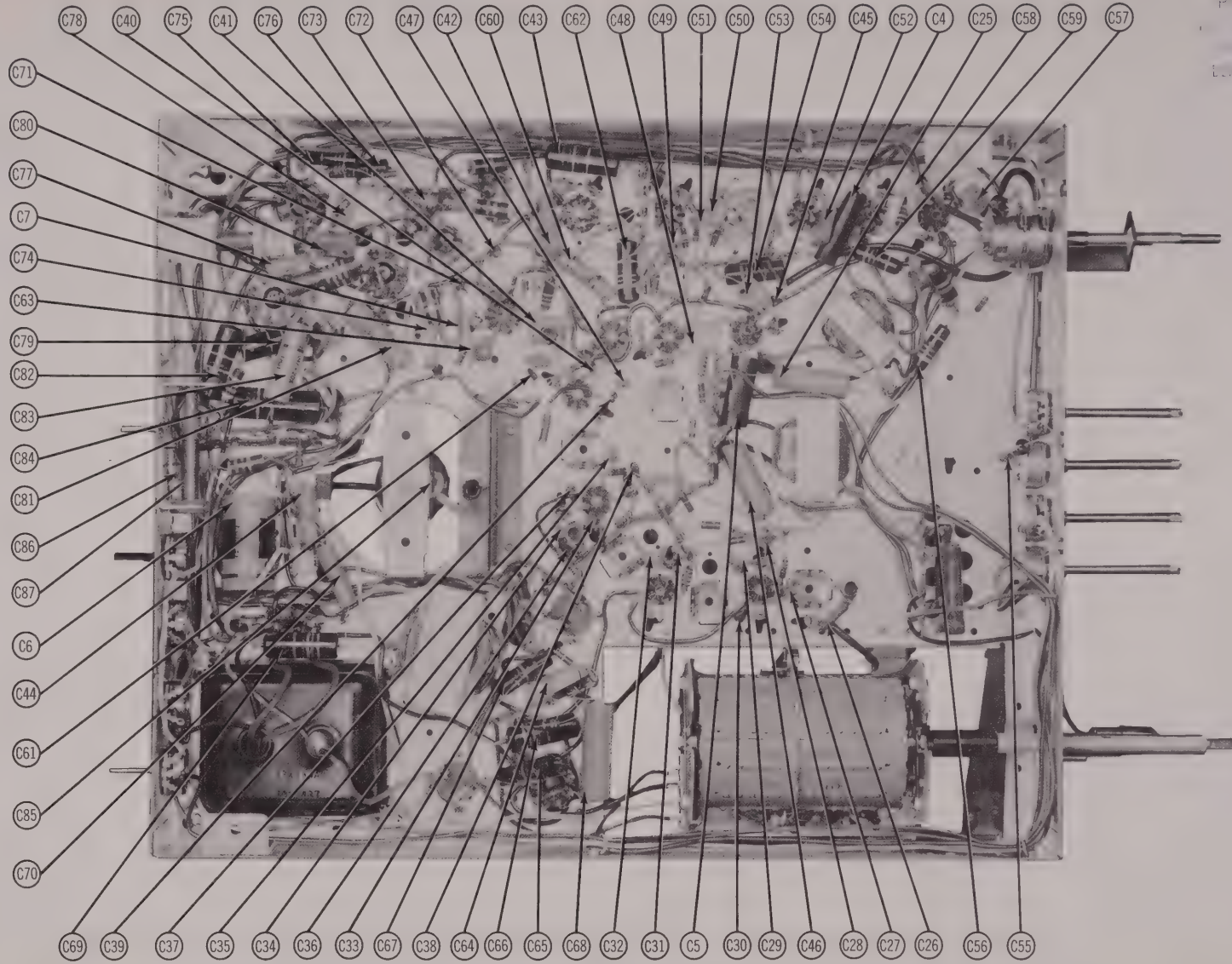
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	RCV-500KTT-3F	Q18-133XX		ABT-160	UDT-283	Loudness-tapped @275KΩ and 100KΩ
B	Shaft		Not Req.	Not Req.		AK-3	Not Req.	Attach to R1A
R2	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Treble-tapped @ 600KΩ
R3	1Meg	½	RCV-1MT-3F	Q19-137X		BT-71	UT-443	Bass-tapped @ 600KΩ
R4	4000Ω	½	RCV-4000-3F	Q17-114		B-12		Dynaural
R5A	500KΩ	½	RCV-500K-3	Q13-133	A47-500K-Z	B-60	U-48	Level
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R5A
R6A	500Ω	½	RCV-500-S	Q11-103	A47-500-S	AB-4	U-2	Hum Adjust
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	50KΩ	½	RCV-50K-S	Q11-123	A47-50K-S	AB-31	SU-35	Balance
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R7A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H. Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R8	47KΩ	½		BTS-47K	
R9	2700Ω	½		BTS-2700	
R10	270KΩ	½		BTS-270K	
R11	470KΩ	½		BTS-470K	
R12	22Meg	½		BTS-22Meg	
R13	56KΩ	½		BTS-56K	
R14	1.5Meg	½		BTS-1.5Meg	
R15	3.3Meg	½		BTS-3.3Meg	
R16	820KΩ	½		BTS-820K	
R17	1Meg	½		BTS-1Meg	
R18	2700Ω	½		BTS-2700	
R19	270KΩ	½		BTS-270K	
R20	10Meg	½		BTS-10Meg	
R21	220KΩ	½		BTS-220K	
R22	680KΩ	½		BTS-680K	
R23	2.2Meg	½		BTS-2.2Meg	
R24	820Ω	½		BTS-820	
R25	33KΩ	½		BTS-33K	
R26	470KΩ	½		BTS-470K	
R27	470KΩ	½		BTS-470K	
R28	1500Ω	½		BTS-1500	
R29	100KΩ	1		BTA-100K	
R30	220KΩ	½		BTS-220K	
R31	150KΩ	½		BTS-150K	
R32	220KΩ	½		BTS-220K	
R33	3300Ω	½		BTS-3300	
R34	22KΩ	½		BTS-22K	

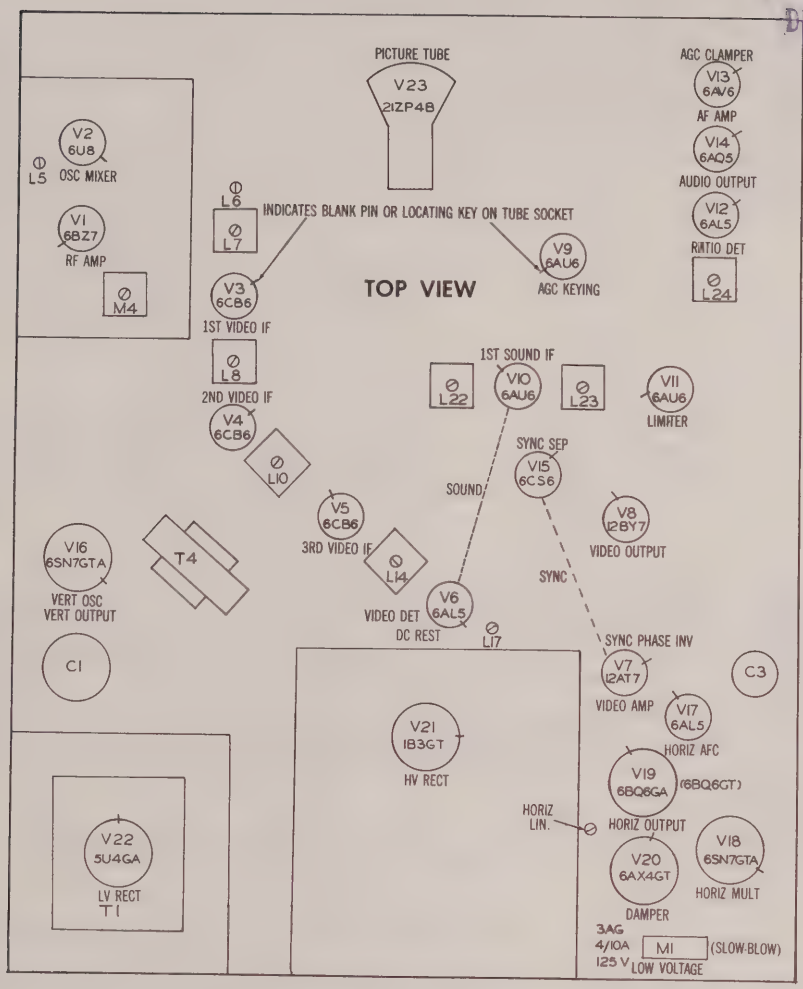
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: H.H.Scott PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R35	2.7Ω	1			
R35	47KΩ	½		BTS-47K	
R37	15KΩ	½		BTS-15K	
R38	10KΩ	½		BTS-10K	
R39	82KΩ	½		BTS-82K	
R40	2.2Meg	½		BTS-2.2Meg	
R41	2200Ω	½		BTS-2200	
R42	47KΩ	½		BTS-47K	
R43	470KΩ	½		BTS-470K	
R44	100KΩ	1		BTA-100K	
R45	470KΩ	½		BTS-470K	
R46	2.2Meg	½		BTS-2.2Meg	
R47	2.2Meg	½		BTS-2.2Meg	
R48	10Meg	½		BTS-10Meg	
R49	10Meg	½		BTS-10Meg	
R50	1Meg	½		BTS-1Meg	
R51	470KΩ	½		BTS-470K	
R52	220KΩ	½		BTS-220K	
R53	2.2Meg	½		BTS-2.2Meg	
R54	4.7Meg	½		BTS-4.7Meg	
R55	470KΩ	½		BTS-470K	
R56	2.2Meg	½		BTS-2.2Meg	
R57	150Ω	½		BTS-150	
R58	10KΩ	½		BTS-10K	
R59	1Meg	½		BTS-1Meg	
R60	33KΩ	½		BTS-33K	
R61	330KΩ	½		BTS-330K	



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENS
3924
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V22, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V9, V23
Has pic, no sound - V10, V11, V12, V13, V14
Overloaded picture - V9, V13

SYNC FAILURE
No vert. sync - V7, V16
No horiz. sync - V7, V17, V18
No vert. or horiz. sync - V7, V15

SWEEP FAILURE
No raster, has sound - V18, V19, V20, V21, V23
No vertical deflection - V16
Poor vert. linearity or foldover - V16
Poor horiz. linearity or foldover - V18, V19, V20
Narrow picture - V18, V19, V20, V21, V22
Vert. off freq. - V7, V16
Horiz. off freq. - V7, V17, V18

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS--READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volt battery to the ungrounded side of C28A. Connect the positive lead to chassis.
Remove the RF amplifier tube (V1) from its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to tuner chassis.	44MC (10MC Swp)	41.25MC 45.75MC 47.25MC	Any unused channel.	Vert. amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V3). Low side to chassis.	A1, A2, A3, A4	Adjust A1 to place 47.25MC marker in trap notch as in Fig. 2. Adjust A2, A3 and A4 for response similar to Fig. 2. A2 and A3 affect the flat portion of curve. A4 positions the 41.25MC marker. Make sure 45.75MC marker is on peak as shown or 44.5MC marker on overall response will be incorrect.
2.	"	"	Not used.	42.5MC (Unmod)	"	Use VTVM. DC probe to point Ⓐ. Common to chassis.	A5	Increase bias from 1.5 volts to 4.5 volts at ungrounded side of C28A. Attenuate generator output to maintain 1 volt at VTVM. Adjuse for maximum deflection.
3.	"	"	"	45.3MC	"	"	A6	"
4.	"	"	"	43.9MC	"	"	A7	"
5.	"	"	"	41.25MC	"	"	A8	Adjust for MINIMUM deflection.
6.	"	"	44MC (10MC Swp)	41.25MC 42.25MC 42.5MC 43.9MC 44.5MC 45.3MC 45.75MC 47.25MC	"	Vert. amp. thru 10KΩ to point Ⓐ. Low side to chassis.		Check for response curve similar to Fig. 3. SLIGHTLY retouch A5 thru A8 to obtain desired response. If A1 thru A4 requires retouching, step 1 should be repeated.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V6A). Low side to chassis.	Not used.	4.5MC (400∿ Mod)	Any unused channel.	Vert. amp. to pin 2 (grid) of picture tube. Low side to chassis.	A9	Adjust for MINIMUM 400∿ indication on scope.

ALTERNATE 4.5MC TRAP ALIGNMENT

Replace the RF amplifier tube (V1) and remove bias battery. Tune in a TV station and adjust A9 for minimum 4.5MC beat interference in picture.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove 6CB6 (V5) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V6A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓑ. Common to chassis.	A10, A11, A12	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A13	Use only enough generator output to provide usable indication on VTVM. Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V5 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6CB6 (V5) from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V6A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp. to point Ⓑ. Low side to chassis.	A10, A11, A12	Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
9.	"	"	"	"	"	Vert. amp. to point Ⓒ. Low side to chassis.	A13	Disconnect stabilizing capacitor C4. Use only enough sweep generator output to provide usable indication on scope. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
10.	"	"	"	"	"	Vert. amp. to point Ⓓ. Low side to chassis.	A14	Reconnect stabilizing capacitor C4. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines. Replace V5 in its socket.

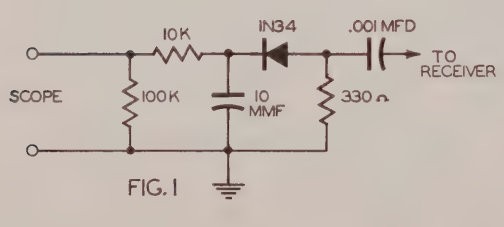


FIG. 1

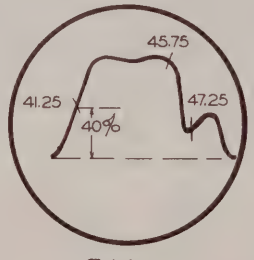


FIG. 2

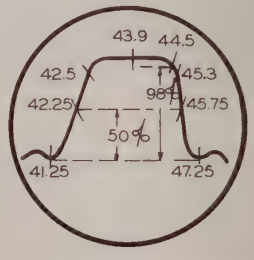


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Connect the negative lead of a 4.5 volt battery to the ungrounded side of C28A. Positive lead to chassis.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels, it may be possible to correct them in one step using A15 adjustment. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A15 will not bring all channels well within range of the fine tuning control, it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached through a hole just to the left of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Replace the RF amplifier (V1) in its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω carbon resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. thru 10KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt battery to the ungrounded side of C25. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω carbon resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. amp. thru 10KΩ to point (E). Low side to chassis.	A28, A29 A30	Adjust for response similar to Fig. 7 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel, make compromise adjustment of A28, A29 and A30 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF bandpass (40-48MC). Tune in a station on which the interference is noted and adjust A31 for minimum interference in the picture.

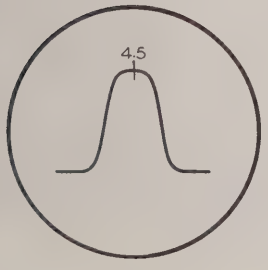


FIG.4

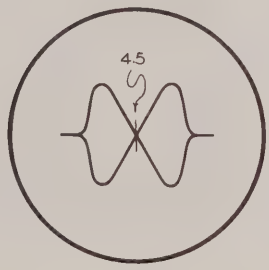


FIG.5

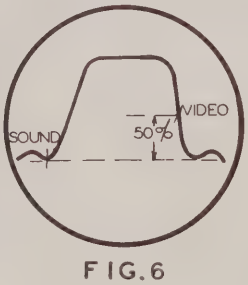


FIG.6

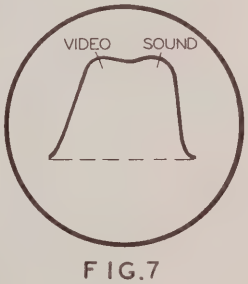
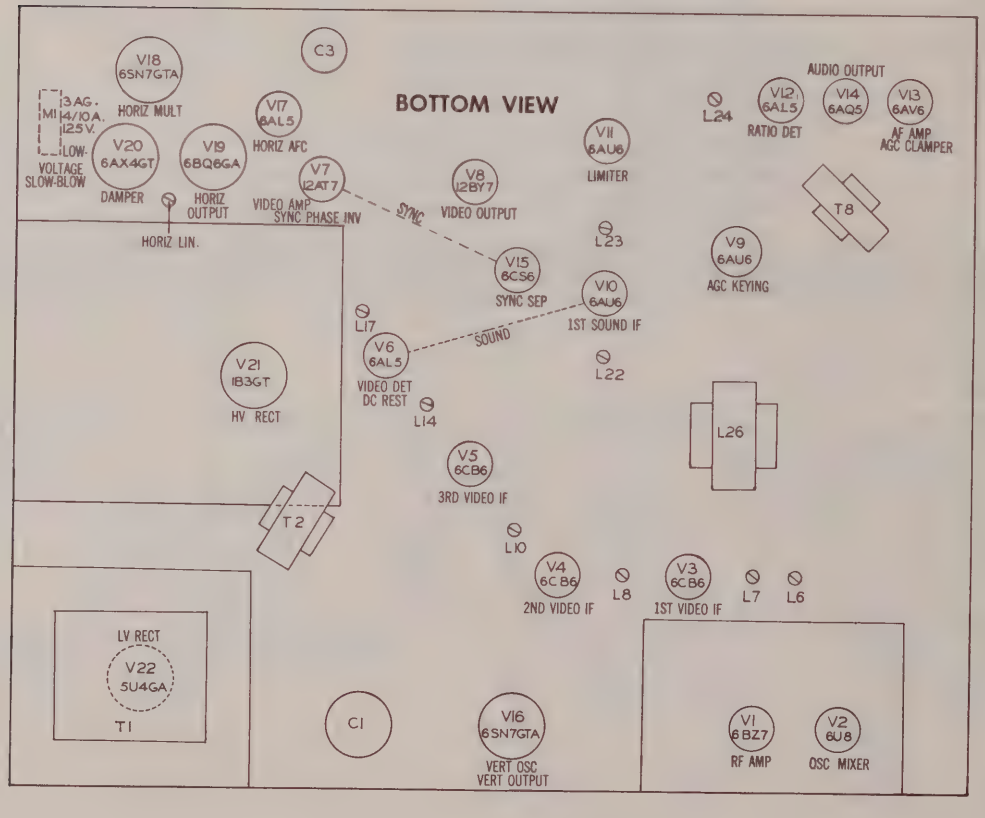


FIG.7

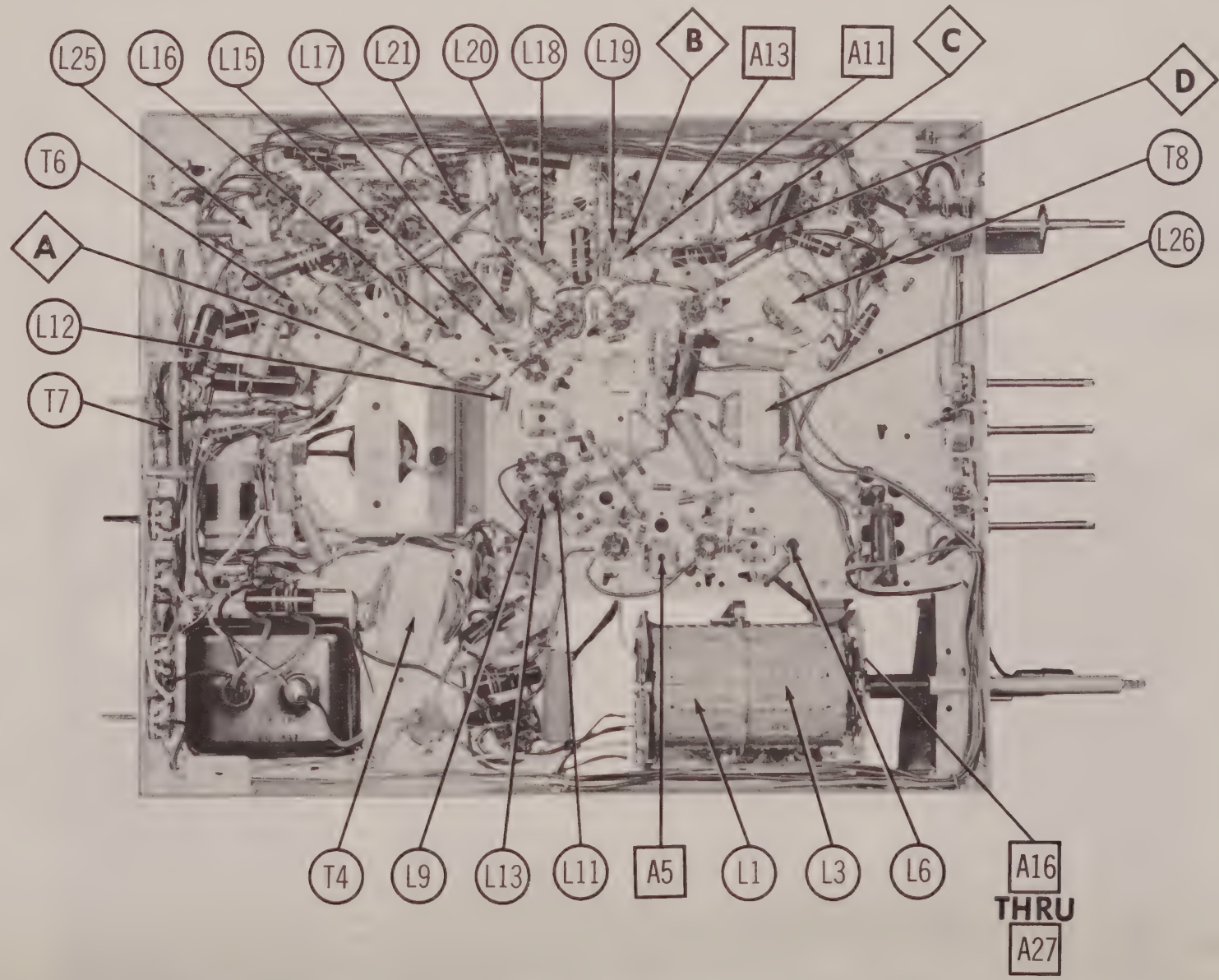
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1.8KΩ	†300KΩ	INF	0Ω	.1Ω	INF	750KΩ	0Ω	0Ω
V 2	6U8	†5.5KΩ	200KΩ	†100KΩ	.1Ω	0Ω	†8.5KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	80KΩ	47Ω	0Ω	.1Ω	†2.8KΩ	†2.8KΩ	0Ω		
V 4	6CB6	80KΩ	47Ω	0Ω	.1Ω	†3KΩ	†3KΩ	0Ω		
V 5	6CB6	.2Ω	180Ω	0Ω	.1Ω	†4KΩ	†4KΩ	0Ω		
V 6	6AL5	1Meg	3.9KΩ	.1Ω	0Ω	.5Ω	0Ω	0Ω		
V 7	12AT7	†9KΩ	3.9KΩ	.2Ω	0Ω	0Ω	†5.5KΩ	†820KΩ	3.3KΩ	.1Ω
V 8	12BY7	450Ω	1Meg	0Ω	.1Ω	.1Ω	0Ω	†4.5KΩ	†2.5KΩ	0Ω
V 9	6AU6	†35KΩ	†2.3KΩ	.1Ω	0Ω	350KΩ	†400Ω	†2.3KΩ		
V 10	6AU6	6.5Ω	0Ω	0Ω	.1Ω	†3.3KΩ	†3.3KΩ	100Ω		
V 11	6AU6	56KΩ	0Ω	.1Ω	0Ω	†3.3KΩ	†27KΩ	0Ω		
V 12	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 13	6AV6	10Meg	0Ω	.1Ω	0Ω	750KΩ	750KΩ	†500KΩ		
V 14	6AQ5	500Ω	330Ω	0Ω	.1Ω	†1.8KΩ	†1.3KΩ	500KΩ		
V 15	6CS6	40KΩ	0Ω	.1Ω	0Ω	†820KΩ	†70KΩ	1.5Meg		
V 16	6SN7GTA	4Meg	•2.5Meg	190Ω	2.2Meg	•8.5KΩ	2.2KΩ	0Ω	.1Ω	
V 17	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	8.5KΩ	NC	8.5KΩ		
V 18	6SN7GTA	5Meg	†5KΩ	1.5KΩ	180KΩ	†200KΩ	1.5KΩ	.1Ω	0Ω	
V 19	6BQ6GA	TP	0Ω	TP	†15KΩ	470KΩ	TP	.1Ω	100Ω	Top Cap •15Ω
V 20	6AX4GT	TP	NC	120KΩ	TP	†55Ω	NC	.1Ω	0Ω	
V 21	1B3GT	PINS 1 - 8 HAVE INFINITE RESISTANCE								Top Cap •435Ω
V 22	5U4GA	INF	30KΩ	INF	20Ω	INF	19Ω	INF	30KΩ	
V 23	21ZP4B	0Ω	1.1Meg	Pin 10 •6.8KΩ	Pin 11 †250KΩ	Pin 12 .1Ω				

† MEASURED FROM PIN 2 OF V22.
• MEASURED FROM PIN 3 OF V20.
TP - TIE POINT
NC - NO CONNECTION

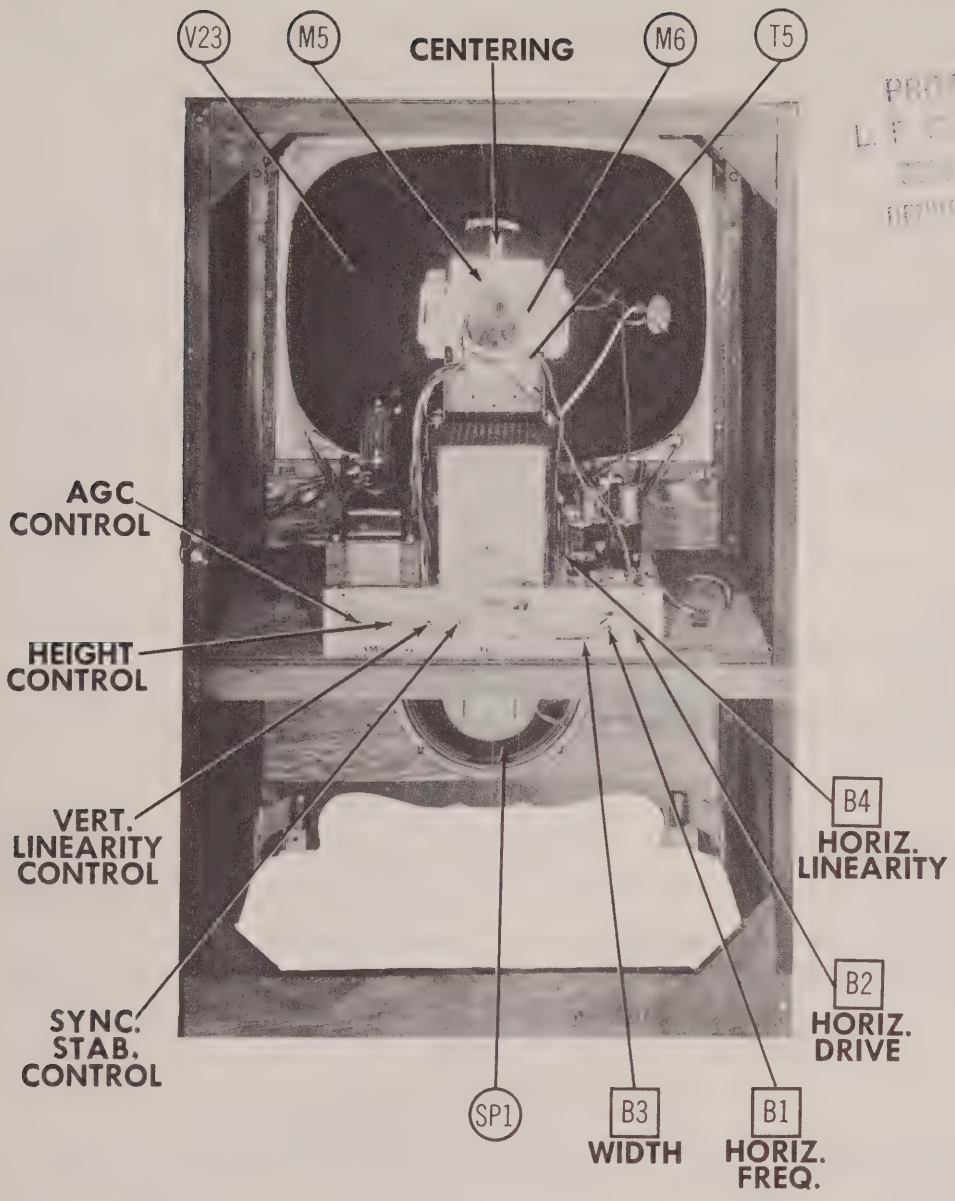


TUBE PLACEMENT CHART



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. [illegible]



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. If horizontal hold control fails to maintain sync, set it in the middle of its range and adjust the horizontal frequency slug B1 until the picture is in sync.

Check other channels and if necessary, readjust B1 slightly for best sync on all channels. With picture locked in sync, turn contrast control (R1A) to minimum, adjust brightness control for a washed-out picture.

Adjust the width control (B3) for a picture slightly wider than necessary to fill mask horizontally.

Turn horizontal drive trimmer (B2) inward (if necessary) until horizontal drive line disappears.

Adjust horizontal linearity slug (B4) for a picture that is symmetrical from left to right. Adjust the picture centering device located in front of focus magnet to center picture in the mask.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20 and V22. Check adjustments B2, B3 and B4. Check T3, T5A, R102, R103, C80, C7 and other associated components.

DRIVE LINES

Check by substitution V19 and V20. Check adjustments B2 and B4. Check R102, R103, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18, V19 and V20. Check C76 for open. Check L25, C77, C75, R94 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T3 and T5 for internal arcing. Check C74, C73, C77, C78, L25, R91, R92, R96 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V16. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R84, C2B and other associated components.	Check C66, C68, R79, R8, R106, R77, T2 and other associated components.

INSUFFICIENT SWEEP

Substitute V16. Check height and vertical linearity controls for proper operation. Check R79, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V16. Check R106, R8, R79, C68, T2 and other associated components.

COMPRESSED AT TOP

Substitute V16. Check R84, R7, C2B, C68, T4 and other associated components.

FOLDS

Substitute V16. Check C66, C67, C68, R82 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V15 and V7. Check C60, C62, R68, R70, R72, R74 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V16. Check vertical integrator network. Check R77, R5, R78, T2, C64 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check horizontal AFC network. Check C71, C72, L25, R96, R2, R94 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V15, V17 and V18. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check C42, C43, R35, R36, R40, R41, L18, L21 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. Check video IF alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check contrast control. Check L19, L20, L15, C42, C43 and other associated components.

NEGATIVE PICTURE

Check by substitution V7 and V8. Check picture tube. Check L16, L19, L20, C42, C43, R39 and other associated components.

SMEAR

Check by substitution V7 and V8. Check L15, L16, L19, L20, C42, C43 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages V13 and V14 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C54, C57, C58A, C59, C3C, C3B, R66, R64A, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A14 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check M1 fuse. Substitute V22. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V22. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		TRUETONE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BZ7	6BZ7	9AJ	6BQ7 used in some versions.
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Det-				
	DC Restorer	6AL5	6AL5	6BT	
V7	Video Amp-				
	Sync Phase Inv.	12AT7	12AT7	9A	
V8	Video Output	12BY7	12BY7	9BF	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	1st Sound IF Amp.	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Ratio Det	6AL5	6AL5	6BT	
V13	AF Amp-				
	AGC Clamper	6AV6	6AV6	7BT	
V14	Audio Output	6AQ5	6AQ5	7BZ	
V15	Sync Sep.	6CS6	6CS6	7CH	
V16	Vert. Osc.				
	Vert. Output	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. AFC	6AL5	6AL5	6BT	
V18	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V19	Horiz. Output	6BQ6GA	6BQ6GA	6AM	6BQ6GT used as an alternate
V20	Damper	6AX4GT	6AX4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4GA	5U4GA	5T	5U4G used as an alternate

I ... TY OF
L. ... NKENSHIP
3824 ... DE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	TRUETONE PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V23	21ZP4B ①	21ZP4B ① 21ZP4A	21ZP4B ① 21ZP4A	21ZP4B ③ 21ZP4A 21ZP4 ②	21ZP4B ① 21ZP4A	12N 12N	① Aluminized ② Circuit change necessary. ③ Silver Screen.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	TRUETONE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲80	400	45X390	FP229.4	TM-D80-450	T-180	
B	▲60	400					
C2A	▲80	400	45X391	FP229.8	TM-3057	T-720	
B	▲100	50					
C3A	■20	400	45X392	FP366	TM-3037	T-700	
B	▲10	400					
C	40	50					
C4	5	25	45X378	TC30	TD-5-25	MMT-0505	
C5	4	100	45X361	TC40	TD-4-150	FM-1504	
C6	30	400	45X393	TC77	TD-30-450	FM-4530	
C7	5	25	45X378	TC30	TD-5-25	MMT-0505	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	TRUETONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C8	3-9		31A-079	829-10			
C9	1000		13L-8X102Z	DD-102	801-001	DC-521	
C10	3		13L-8C030K	TCZ-3	NP0A-030	ZT-5533	
C11	800		13M-28N102Z-03				
C12	.5-3		31A-056-1	829-3	3115-01-0R5	CT-565A	
C13	1.5		13L-8C1R5C	TCZ-1.5	NP0A-1R5	ZT-5515	
C14	47		13L-8Q470K	D6-470	831-470	UC-5447	
C15	800		13M-28N102Z-03				
C16	47						
C17	.5-3		31A-056-1	829-3	3115-01-0R5	CT565A	
C18	5		13L-8UA050C				
C19	10		13L-8T100A				
C20	.5-3		31A-056-1	829-3	3115-01-0R5	CT565A	
C21	800		13M-28N102Z-03				
C22	220		13L-12D221K	D6-221	811-221	UC-5322	
C23	1000		13L-8X102Z	DD-102	801-001	DC-521	
C24	800		13M-28N102Z-03				
C25	.22	200	RCP10M2224M			PT4022	
C26	36		47X626				
C27	47		47X603	D6-470	GP1K-470	UC-5447	
C28A	1000		80X3	DD2-102	812-001	DCD-521	
B	1000						
C29	680		80X5	DD-681	811-681	UC-5368	
C30	1000		80X1	DD-102	801-001	DC-521	
C31A	1000		80X3	DD2-102	812-001	DCD-521	
B	1000						
C32	680		80X5	DD-681	811-681	UC-5368	
C33	1		47X588	TCZ-1	NP0A-010		
C34	150	500	RCM15E151K	TCZ-150	NP0-334-151	MCB236	
C35	470		80X4	DD-471	831-471	UC-5347	
C36	470		80X4	DD-471	831-471	UC-5347	
C37	1000		80X1	DD-102	801-001	DC-521	
C38	1000		80X1	DD-102	801-001	DC-521	
C39	1000		80X1	DD-102	801-001	DC-521	
C40	5		47X562	TCZ-5	NP0A-050	ZT-555	
C41	360	500	47X568				
C42	.047	400	RCP10M4473M	DF-503		PT4147	
C43	.1	400	RCP10M4104M	DF-104		PT401	
C44	.1	200	RCP10M2104M	DF-104		PT401	
C45	1000		80X1	DD-102	801-001	DC-521	
C46	.22	200	RCP10M2224M			PT4022	
C47	1.5		47X584	TCZ-1.5	NP0A-1R5	ZT-5515	

L ... SHIP
3324 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA TRUETONE PART No	CENTRALAB PART No	ERIE PART No	MALLORY PART No	NOTES
C48A	10000		80X6	DD3-103	81-01	DC-511	
B	10000				811-01	DC-511	
C49	100		47X604	D6-101	GP1K-101	UC-531	
C50	5000		47X507	DD-502	811-005	DC-525	
C51	5000		47X507	DD-502	811-005	DC-525	
C52	330	500	47X570	D6-331	GP1K-331	UC-5333	
C53	470	500	47X535	D6-471	GP2K-471	UC-5347	
C54	.047	200	RCP10M3473M	DF-503		PT4147	
C55	.0047	400	RCP10M4473M	D6-472	GP3-333-472	PT6247	
C56	.0047	400	RCP10M4473M	D6-472	GP3-333-472	PT6247	
C57	5000		47X507	DD-502	811-005	DC-525	
C58A	10000						
B	250		†76X5	†PC-80	†1404-01		
C							
C59	.0047	600	RCP10M6472M	D6-472	GP2-333-472	PT6247	
C60	.01	400	RCP10M4103M	D6-103	GP2-333-103	PT411	
C61	1000		80X1	DD-102	801-001	DC-521	
C62	.047	400	RCP10M4473M	DF-503		PT4147	
C63A	2000					DC-522	
B	5000		♦76X7	♦PC-100	♦1405-01	DC-525	
C	5000					DC-525	
C64	4700	500	47X543			MCB465	
C65	.022	200	RCP10M2233M	DF-203	817-02	PT4122	
C66	.047	600	RCP10M6473M	DF-503		PT6147	
C67	.022	300	RCP10M2233M	DF-303	817-02	PT4122	
C68	.1	600	RCP10M6104M	DF-104		PT601	
C69	.047	600	RCP10M6473M	DF-503		PT6147	
C70	.015	600	RCP10M6153M			PT6115	
C71	1000		80X1	DD-102	801-001	DC-521	
C72	1000		80X1	DD-102	801-001	DC-521	
C73	.01	400	RCP10M4103M	D6-103	GP2-333-103	PT411	
C74	270	500	RCM20A271K	D6-271	GP2K-271	MC241	
C75	.0047	400	RCP10M4473M	D6-472	GP2-333-472	PT6247	
C76	.047	300	RCP10M3473M	DF-503		PT4147	
C77	4700	500	47X543			MCB465	
C78	390	500	RCM20B391J			MCB343	
C79	.1	400	RCP10M4104M	DF-104		PT401	
C80	330	500	47X570				
C81	.047	400	RCP10M4473M	DF-503		PT4147	
C82	.1	400	RCP10M4104M	DF-104		PT401	
C83	.047	400	RCP10M4473M	DF-503		PT4147	
C84	.15	400	RCP10M4154M			PT4015	
C85	500	20000	47X580	TV3-502	413	HV-20035A	
C86	1000		47X615	DD-103	811-01	DC-511	
C87	10000		47X615	DD-103	811-01	DC-511	

† Items C58A, C58B, C58C, R64A and R64B are combined in one unit.
When replacing items separately C58B and C58C should total 250MMF.
♦ Items C63A, C63B, C63C, R75A, R75B and R75C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	‡	B76X21	*QJ-638	RTY-502	F1-4	UF13L	Contrast - Panel
B	1Meg	‡				R1-59	UR16-T254	Volume tapped at 250KΩ - Rear
C	Switch					KS-3	UR-28	Attach to R1B
R2A	50KΩ	‡	B40X361-C	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R2A
R3A	1.5Meg	‡	B40X334-E	Q11-138	A47-1.5Meg-S	AB-75	U-160	Tone
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	‡	B40X333-A	Q11-139	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	RS-3/8	AK-8	Not Req.	Attach to R4A
R5A	1.5Meg	‡	B40X334-E	Q11-138	A47-1.5Meg-S	AB-75	U-165	Vert. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	Not Req.	Attach to R5A
R6A	7.5Meg	‡	B40X379A	Q11-143	A47-7.5Meg-S	AB-89	U-82	Sync Stability
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-4	Not Req.	Attach to R6A
R7A	8000Ω	‡	B40X375	Q11-116	A47-10K-S	AB-14	SU-30	Vert. Linearity
B	Shaft		Not Req.	NQ	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	2.5Meg	‡	B40X369A	Q11-239	A47-2.5Meg-S	AB-83	SU-565	Height
B	Shaft		Not Req.	NQ	FKS-1/4	AK-4	Not Req.	Attach to R8A
R9A	2.5Meg	‡	B40X369A	Q11-239	A47-2.5Meg-S	AB-83	SU-565	AGC
B	Shaft		Not Req.	NQ	FKS-1/4	AK-4	Not Req.	Attach to R9A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: B1J-108 & P8-218 (PANEL)
B13-137X & R16-313 (REAR)
76-2 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R10	47KΩ	‡		BTS-47K	
R11	22KΩ	‡		BTS-22K	
R12	820KΩ	‡		BTS-820K	
R13	1500Ω	1		BTA-1500	
R14	470KΩ	‡		BTS-470K	
R15	100KΩ	‡		BTS-100K	
R16	100KΩ	‡		BTS-100K	
R17	100KΩ	‡		BTS-100K	
R18	82000Ω	‡		BTS-8200	
R19	82000Ω	‡		BTS-8200	
R20	10KΩ	‡		BTS-10K	
R21	3300Ω	1		BTA-3300	
R22	33000Ω	5% ‡	B83470	BTS-3300 5%	
R23	470Ω	5% ‡	B83470	BTS-47 5%	
R24	470Ω	‡	B85471	BTS-470	
R25	10000Ω	‡	B85003	BTS-1000	
R26	39KΩ	5% ‡	B83393	BTS-39K 5%	
R27	47Ω	5% ‡	B83470	BTS-47 5%	
R28	470Ω	‡	B85471	BTS-470	
R29	150Ω	‡	B85151	BTS-150	
R30	39KΩ	5% ‡	B83393	BTS-39K 5%	
R31	180Ω	‡	B84181	BTS-180	
R32	150Ω	‡	B84152	BTS-1500	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R33	150Ω	‡	B85151	BTS-150	
R34	3900Ω	5% ‡	B83392	BTS-3900 5%	
R35	5600Ω	1	C84562	BTA-5600	
R36	1500Ω	‡	B84152	BTS-1500	
R37	33KΩ	‡	B84333	BTS-33K	
R38	1Meg	‡	B84105	BTS-1Meg	
R39	68Ω	‡	B84680	BTS-68	
R40	2000Ω	5% ‡	D83202	BTS-2000 5%	
R41	2000Ω	5% ‡	D83202	BTS-2000 5%	
R42	100KΩ	‡	B84104	BTS-100K	
R43	1Meg	‡	B84105	BTS-1Meg	
R44	22KΩ	‡	B84223	BTS-22K	
R45	100KΩ	‡	B85104	BTS-100K	
R46	47KΩ	‡	B85473	BTS-47K	
R47	47KΩ	‡	B84473	BTS-47K	
R48	470KΩ	‡	B84474	BTS-470K	
R49	2.7Meg	‡	B84275	BTS-2.7Meg	
R50	330KΩ	‡	B83334	BTS-330K	
R51	100KΩ	‡	B84104	BTS-100K	
R52	100Ω	‡	B84101	BTS-100	
R53	1000Ω	‡	B85102	BTS-1000	
R54	56KΩ	‡	B84563	BTS-56K	
R55	33KΩ	‡	B84333	BTS-33K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R56	1000Ω	‡	B85102	BTS-1000	
R57	33KΩ	‡	B84333	BTS-33K	
R58	270Ω	‡	B84271	BTS-270	
R59	68KΩ	‡	B84683	BTS-68K	
R60	10KΩ	5% ‡	B83103	BTS-10K 5%	
R61	10KΩ	5% ‡	B83103	BTS-10K 5%	
R62	68KΩ	‡	B84683	BTS-68K	
R63	10Meg	‡	B85106	BTS-10Meg	
R64A	500KΩ	‡	†76X5	BTS-470K	
B	500KΩ	‡		BTS-470K	
R65	330Ω	1	C84331	BTA-330	
R66	1000Ω	2	D84102	BTB-1000	
R67	47KΩ	‡	B84473	BTS-47K	
R68	10KΩ	‡	B84103	BTS-10K	
R69	270KΩ	‡	B84274	BTS-270K	
R70	68KΩ	‡	B84683	BTS-68K	
R71	1.5Meg	‡	B84155	BTS-1.5Meg	
R72	820KΩ	‡	B84824	BTS-820K	
R73	33000Ω	5% ‡	B83332	BTS-3300 5%	
R74	33000Ω	5% ‡	B83332	BTS-3300 5%	
R75A	22KΩ	♦		BTS-22K	
B	8200Ω	♦	♦76X7	BTS-8200	
C	8200Ω	♦		BTS-8200	
R76	22KΩ	‡	B84223	BTS-22K	
R77	3.3Meg	5% ‡	B84335	BTS-3.3Meg 5%	
R78	22KΩ	‡	B84223	BTS-22K	
R79	1.5Meg	‡	B84155	BTS-1.5Meg	
R80	2.2Meg	‡	B84225	BTS-2.2Meg	
R81	200KΩ	5% ‡		BTS-200K 5%	
R82	8200Ω	‡	B84822	BTS-8200	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R83	2.2Meg	‡	B84225	BTS-2.2Meg	
R84	820Ω	‡	B84821	BTS-820	
R85	2200Ω	‡	B84222	BTS-2200	
R86	560Ω	‡		BTS-560	
R87	100KΩ	‡	B84104	BTS-100K	
R88	4.7Meg	‡	B85475	BTS-4.7Meg	
R89	100KΩ	‡	B84104	BTS-100K	
R90	27KΩ	‡	B84273	BTS-27K	
R91	6800Ω	1	C84682	BTA-6800	
R92	6800Ω	1	C84682	BTA-6800	
R93	470KΩ	‡	B85474	BTS-470K	
R94	1500Ω	5% ‡	B83152	BTS-1500 5%	
R95	4700Ω	5% ‡	B83472	BTS-4700 5%	
R96	150KΩ	‡	B83154	BTS-150K	
R97	180KΩ	‡	B84184	BTS-180K	
R98	8200Ω	‡	B84822	BTS-8200	
R99	470KΩ	‡	B84474	BTS-470K	
R100	68Ω	‡	B85680	BTS-68	
R101	100Ω	2	D84101		
R102	33KΩ	2	D84333	BTB-33K	
R103	27KΩ	2	D84273	BTB-27K	
R104	47KΩ	‡	B84473	BTS-47K	
R105	47KΩ	1	C84473	BTA-47K	
R106	6800Ω	2	D84682	BTB-6800	
R107	5800Ω	‡	B84562	BTS-5800	
R108	3.3Ω	1	43X338		
R109	1Meg	1	C85104	BTA-1Meg	
R110	2000Ω	10	43X285	1 3/4A-2000	
R111	330Ω	10	43X273		
R112	100KΩ	2	D85104	BTB-100K	
R113	270KΩ	‡	B85274	BTS-270K	

† Items R64A, R64B, C58A, C58B and C58C are combined in one unit.
♦ Items R75A, R75B, R75C, C63A, C63B and C63C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
	PRI.	SEC. 1	SEC. 2							
T1	117VAC ⑩ 1.7A	606VCT 250ADC	5VAC ⑩ 3A	53X338A	P-8333 ①				PS715 ②	
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑩ 2.5A									

① Tape small 6.3 volt winding.
② Tape low voltage taps on HV secondary, also low ampere 6.3 volt winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA TRUETONE PART No.	Halldorson PART No	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	54X10	B6702	A-3003	209T1 ①	V405	A-8125	24A87 ①	A-97X
T3	Horiz. Output Trans.	53X330	FB411 & HV0-9 ⑥	RF800P ① MWC-1 ④	232T1 & 212R1 ④	X110*	A-8137 & DY-9A ⑤	F1Y-24 & Y-6 ⑤	D-35 & WC-12 ④
T4	Vert. Output Trans.	51X168	21806 ①	A-3039 ①	226T1 ①	V312 ①	A-8141 ①	26B54 ①	A-104X ①
T5A	Yoke-Horiz. (15.5MH)	9A2334-1	DF602 ⑤	MDF-75 ①	211D2 ⑤	Y70F14 ④	DY-9A ⑤	Y-6 ⑤	Y-17 ⑤
B	Vert. (66MH)								
T6	Horiz.Lin.Coil (1.2-6.6MH)	9A2282	RF800 ③ ④	MWC-6 ③	213R1	201R15	WC-8	WC-32	WC-13 ⑤
T7	Width Coil (1-6MH)	9A2183			201R4 ⑤	201R4 ⑤	WC-4 ⑥	WC-15 ⑥	

① Drill new mounting hole(s).
② Use original yoke damping network.
③ Enlarge mounting hole.
④ Connect to terms #3 & #4.
⑤ Connect to coded blue and green terms.
⑥ Drill new mounting hole or use original bracket, slider and core.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	6	9	9	10	13	7	9	10
					Jumper 10 & 11			
	5	7	7	8	11	4	7	8
	4	5	5	7	6	T	5	7
	3	See Note ⑦	See Note ⑦	See Note ⑥	4	See Note ⑩	See Note ⑦	See Note ⑥
	2	3	3	NC	2	3	3	NC
	1	1	1	3	1	1	1	3
	A	RF800 Term #3	MWC-1 Orange Term	2	9	WC-5 Orange Term	WC-20 Term #1	2
	G	RF800 Term #4	MWC-1 Black Term	1	8	WC-5 Black Term	WC-20 Term #2	1
Connect Width Coil Across →	2 & 1	RF800 Terms #1 & #2 across 3 & 1	MWC-1 Terms Red & Blue across 3 & 1	212R1 across 2 & 1	2 & 1	WC-5 terms Red & Blue across 3 & 1	WC-20 Terms #3 & #4 across 3 & 1	WC-13 Terms Red & Blue across 2 & 1
Special Notes →		⑦ ⑩	⑦ ⑩	⑧		⑨ ⑩	⑦ ⑩	⑧ ⑪

⑦ Connect a 47 or 56MMF capacitor from terminal #5 to open end of R107. (Original terminal #3 connection.)
⑧ Connect a 47 or 56MMF capacitor from terminal #7 to open end of R107. (Original terminal #3 connection.)
⑨ Connect a 47 or 56MMF capacitor from terminal "T" to open end of R107. (Original terminal #3 connection.)
⑩ If the picture is out of phase, reverse width coil primary or secondary.
⑪ Jumper terms #9 & "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA TRUE TONE PART No	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	5.1KΩ	3.4Ω	51X166	A-3877	A-2930	S-3X	Z1107	24851	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA TRUETONE PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3.4Ω	12A518 ①	10A31	① Used in some versions.
	8"	PM	3.4Ω	12A518 ①	8A21	
	6"	PM	3.4Ω	12A518 ①	6A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0OCT	0Ω	9A2329-2				Channel 2
B	Ant. Coil	0OCT	0Ω	9A2329-3				Channel 3
C	Ant. Coil	0OCT	0Ω	9A2329-4				Channel 4
D	Ant. Coil	0OCT	0Ω	9A2329-5				Channel 5
E	Ant. Coil	0OCT	0Ω	9A2329-6				Channel 6
F	Ant. Coil	0OCT	0Ω	9A2329-7				Channel 7
G	Ant. Coil	0OCT	0Ω	9A2329-8				Channel 8
H	Ant. Coil	0OCT	0Ω	9A2329-9				Channel 9
I	Ant. Coil	0OCT	0Ω	9A2329-10				Channel 10
J	Ant. Coil	0OCT	0Ω	9A2329-11				Channel 11
K	Ant. Coil	0OCT	0Ω	9A2329-12				Channel 12
L	Ant. Coil	0OCT	0Ω	9A2329-13				Channel 13
L2	Neut. Coil	0Ω		31B-727				
L2A	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-2				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-3				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-4				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-7				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		9A2330-13				Channel 13
L4	Fil. Choke	0Ω		34A-704				
L5	Corr. Plate	.1Ω		31K-109				
L6	IF Trap	.1Ω		9A2320				
L7	1st Video IF	.1Ω		9A2316				
L8	2nd Video IF	.2Ω	.2Ω	9A2317		TV-128	6218	Includes 47.25MC trap
L9	Fil. Choke	0Ω		9A2033	19-1002		4606	
L10	3rd Video IF	.3Ω	.2Ω	9A2318		TV-128*	6233*	
L11	Parasitic Suppressor	0Ω		9A2323				1 turn wire on 10Ω resistor
L12	Fil. Choke	0Ω		9A2033	19-1002		4606	
L13	Cathode Trap	0Ω		9A2321				
L14	4th Video IF	.5Ω	.5Ω	9A2319		TV-125	6234	
L15	Series Peaking Coil	8Ω		36A10	19-4060		6172■	60 Microhenries; Wound on 22KΩ resistor
L16	Shunt Peaking Coil	18Ω		36A22	19-3300	TV-195	6155	290 Microhenries
L17	4.5MC Trap	.2Ω		9A2074	20-1004	TV-151	1470	
L18	Shunt Peaking Coil	10.5Ω		36A1	19-3100	TV-181	6177	100 Microhenries
L19	Shunt Peaking Coil	10.5Ω		36A25	19-3100▲	TV-181▲	6177▲	100 Microhenries; Wound on 470Ω resistor
L20	Series Peaking Coil	14Ω		36A12	19-4160■	TV-184■	6180■	160 Microhenries; Wound on 22KΩ resistor
L21	Shunt Peaking Coil	14Ω		36A2	19-3180	TV-184	6154	190 Microhenries
L22	1st Sound IF	6.5Ω		9A2301 ♦	19-1031 ♦	TV-113▲	6203▲	
L23	2nd Sound IF	2.6Ω	2.1Ω	9A2323	17-1021	TV-113	6203	
L24	Ratio Det.	4Ω	.6OCT	9A2395	17-3467	TV-115	6205	Tertiary winding = .5Ω
L25	Horiz. Osc.	64Ω		9A2096	19-1576	TV-163	6210	

* Detune trap.
■ Parallel with 22KΩ resistor.
▲ Parallel with 470KΩ resistor.
♦ Drill mounting holes.
= Use one winding only.

TRUETONE MODELS
2D1430D, E, 2D2433B

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L26	. 250ADC	38. 6Ω	1. 06HY	52X95	C-2326 ①	C-2996 ①	C-23X①	C5037①	26C44

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			TRUETONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313. 400 (3AG-4/10A-S/B)	357091	MDL 4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M2	Dial Light	7A32	#51, Bayonet
M3	Tuner	25A1119	VHF
M4	Trap	31K-225-01	VHF Ant. Input Filter
M5	Focus Magnet	2A438-2	Includes centering device
M6	Ion Trap	2A421	
B2	Trimmer Cap.	17A269	Horizontal Drive (120-400MMF)
	Knob	10A820-1	Fine tuning - Mahogany cabinet
	Knob	10A840-1	Contrast - Mahogany cabinet
	Knob	10A812-1	Channel Selector - Mahogany cabinet
	Knob	10A841-1	On-off-volume -
	Knob	10A820-2	Fine tuning - Oak cabinet
	Knob	10A840-2	Contrast - Oak cabinet
	Knob	10A812-3	Channel Selector - Oak cabinet
	Knob	10A841-2	On-off-volume - Oak cabinet
	Knob	10A826	Red- Secondary controls
	Safety Glass	17X180	Specify complete model number when ordering
	Mask	4X1230-4	Specify complete model number when ordering

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. [illegible] MKTNSHIP
3924 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C83, C82, C84, C81, R102, R103 and other associated components.	Check L25, C77, C78, R97, R95, R94 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, and V22. Check adjustment B2, B3 and B4. Check T3, T5A, R102, R103, R97 and other associated components.

BLOOMING

Check by substitution V19, V20, V21 and V22. Check R109, R102, R103, C84 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7, V8 and V9. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

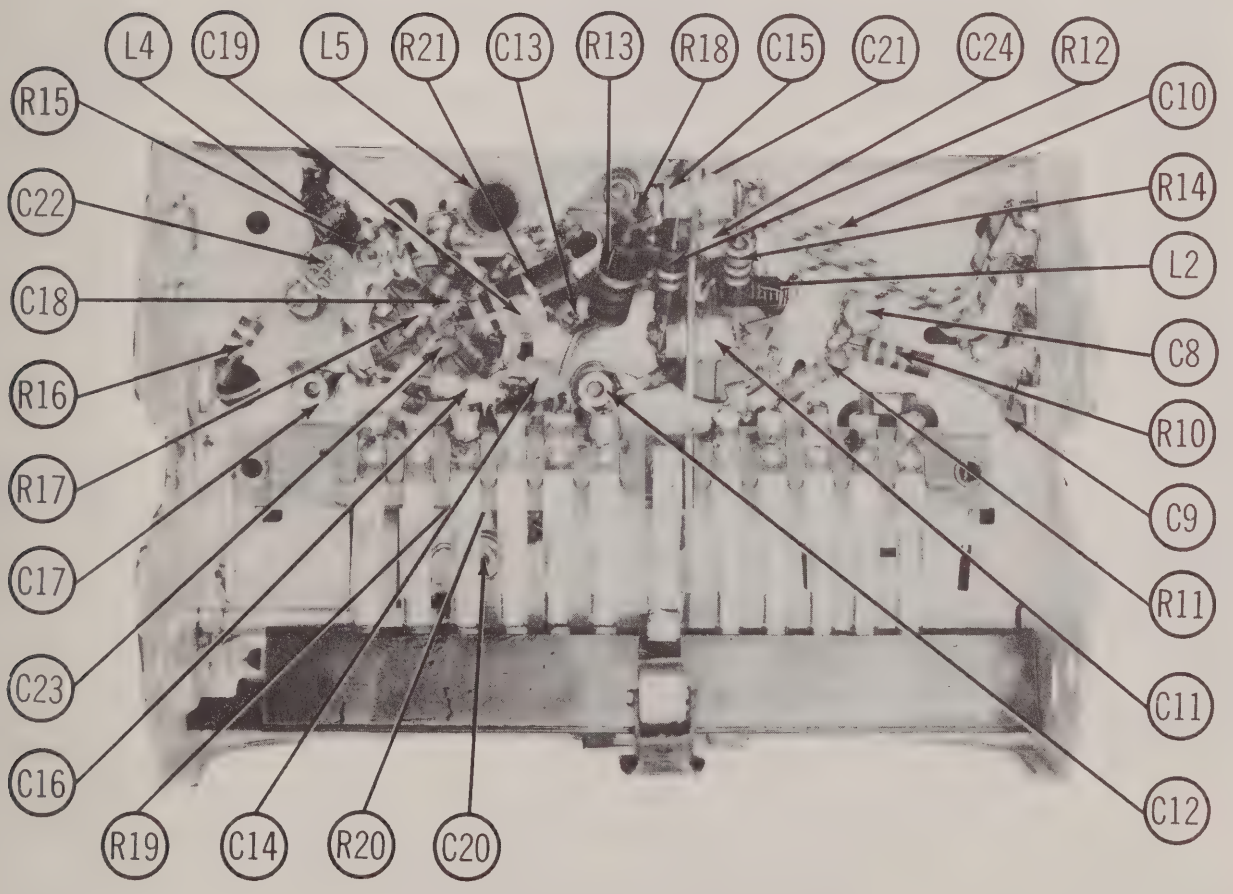
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel switch.

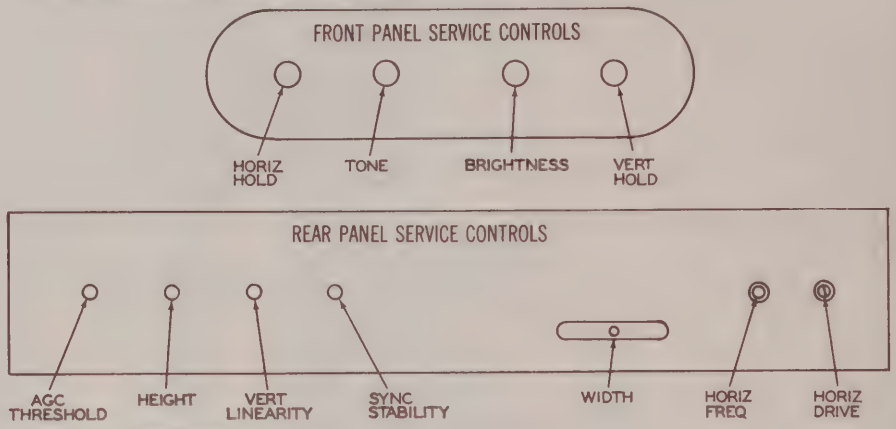
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 5 wood screws holding plastic strip at the top of the safety. Remove plastic strip and safety glass. Use extreme caution when removeing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS

AGC THRESHOLD - Turn the set on and tune in strongest station in that area. Turn the AGC Threshold Control (R9) clockwise until the picture shows signs of overloading, faded out picture and buzz in sound. Turn R9 counter clockwise from the point where overloading occurs until no sign of overloading is noted.

SYNC STABILITY CONTROL - Turn set on and tune in strongest TV station in that area. Rotate the sync stability control (R6).clockwise until bending is noted near the top of picture. Turn R6 counter clockwise until picture bending disappears.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-range position and adjust the horizontal frequency slug (L25) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz adjust the ratio detector secondary (L24) located on top of chassis (See tube placement chart for location).

FUSES

One fuse is used for LV power supply protection.(For location see tube placement chart).

CENTERING

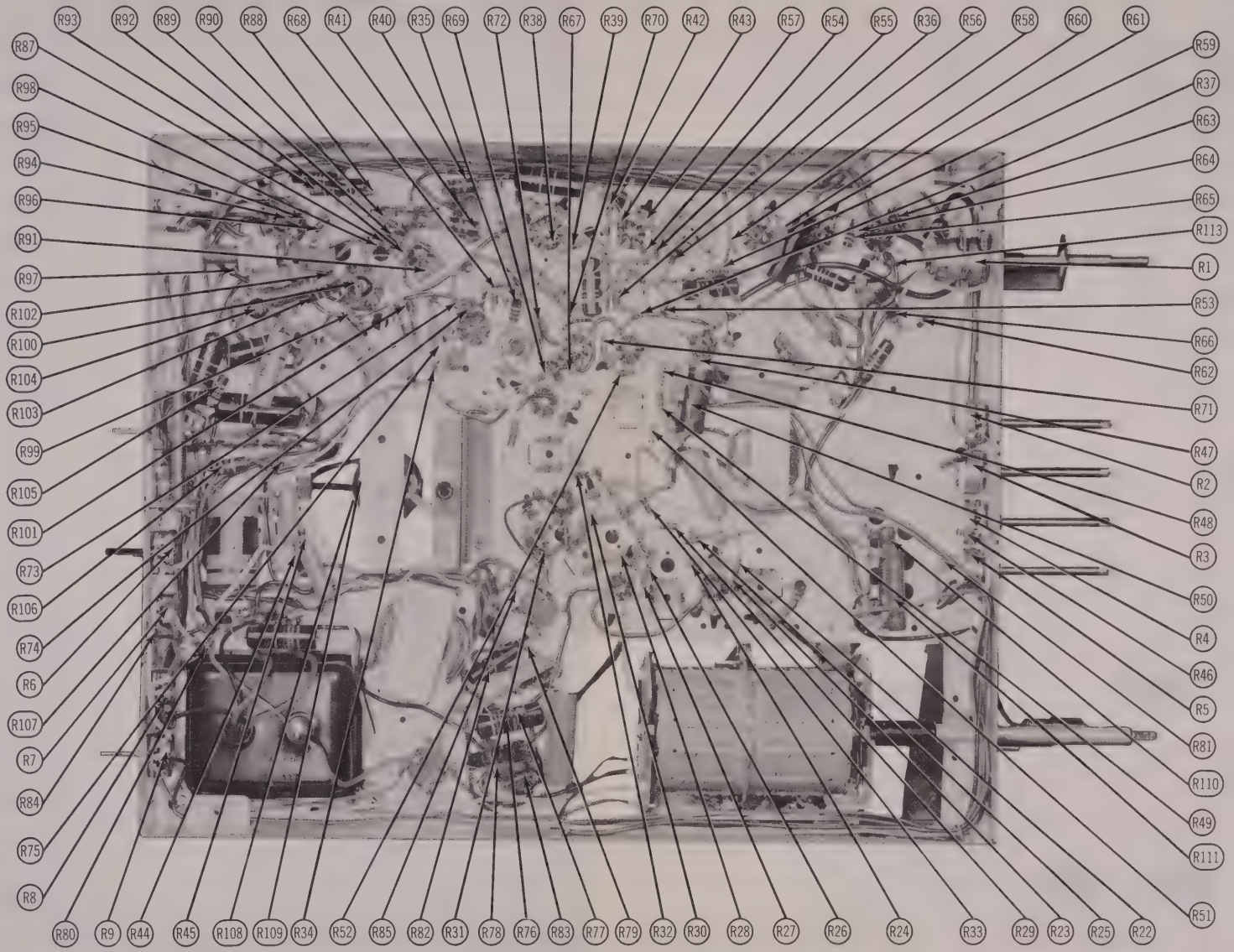
Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 4 metal screws. Remove rear cover.
3. Remove 2 metal screws from antenna leads.
4. Disconnect 2 antenna leads.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

PICTURE TUBE REMOVAL

1. Remove 1 metal screw from front tube mounting band.
2. Remove picture tube socket and HV lead and ion trap.
3. Remove picture tube.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

WESTINGHOUSE MODELS
H-511P4, H512P4 (Ch. V-2237-2)

WESTINGHOUSE MODELS
H-511P4, H512P4 (Ch. V-2237-2)

TRADE NAME	Westinghouse Models H-511P4, H-512P4 (Ch. V-2237-2)
MANUFACTURER	Westinghouse Elect. Corp., TV-Radio Div., Metuchen, N.J.
TYPE SET	Battery Operated Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY RATINGS	1.5 Volts "A" Supply & 67.5 Volts "B" Supply 250MA @ 1.5 Volts DC & 6.5MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to antenna lug on gang. Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop (Radiated)	1600KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	1400KC	"	A6	"

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE
Model H-511P4

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Westinghouse PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det.-AVC-AF Amp.	1U5	1U5	6BW	
V4	Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Westinghouse PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	10	90	V-6321-1	TC-42	TD-10-150	FM-1512	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	NOTES
C2	10000		R2CC63Z5Z103F	DD-103	811-01	DC-511	
C3	5000		R2CC62Z5Z502P	DD-502	811-005	DC-525	
C4	2000		R2CC61Z5Z202P	DD-202	801-002	DC-522	
C5	3.3			TCZ-3R3	NP0A-3R3	ZT-5533	Note 1
C6A	150		♦V-9703-1	D6-151	811-151	UC-5315	
B	2000			D6-202	801-002	DC-522	
C	100			D6-101	801-101	UC-531	
D	5000			D6-502	811-005	DC-525	
E	5000			D6-502	811-005	DC-525	
C7	2000		R2CC61Z5Z202P	DD-202	801-202	DC-522	

Note 1. Not used in some versions.
♦ Items C6A, C6B, C6C, C6D and C6E are combined in one unit.

CONTROLS

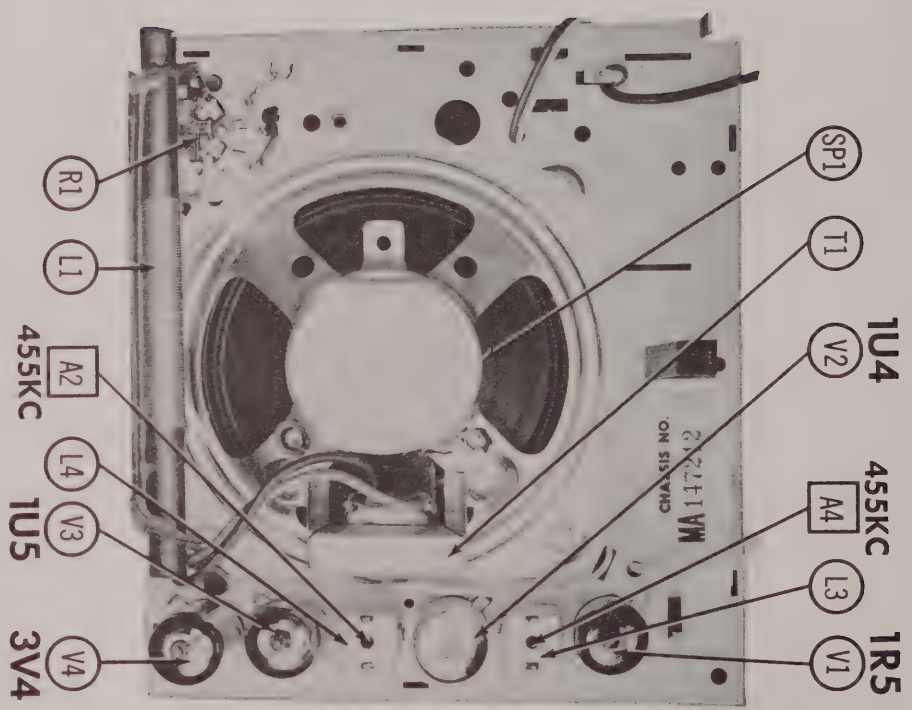
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	V-9993-19	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Westinghouse PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	100KΩ	½	RC20AE104M	BTS-100K	
R3	22KΩ	½	RC20AE223M	BTS-22K	
R4	4.7Meg	½	RC20AE475M	BTS-4.7Meg	
R5	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R6	10Meg	½	RC20AE106M	BTS-10Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Westinghouse PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R7	4.7Meg	½	RC20AE475M	BTS-4.7Meg	
R8	1Meg	½	RC20AE105M	BTS-1Meg	
R9	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R10	560Ω	½	RC20AE561M	BTS-560	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	8.2KΩ	3.6Ω	Part of Spkr.		A-2927①	A-3329	24S49	S-8X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	4"	PM	3.6Ω	V-15501-1	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.8Ω		V-15499-1				
L2	Osc. Coil	3.9Ω	14Ω	V-15502-1	14-1073			
L3	Input IF	18Ω	18Ω	V-15176-1	16-6800		10-C1	
L4	Output IF	16Ω	16Ω	V-15176-2	16-6801		10-C2	

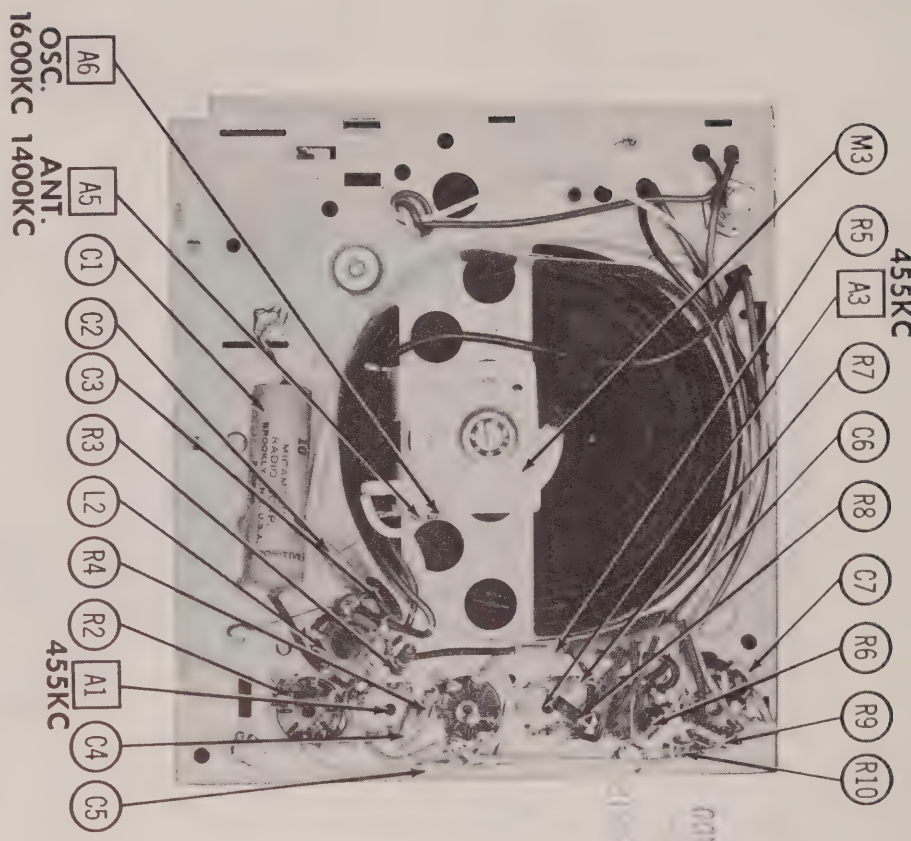
BATTERIES

ITEM No.	VOLTAGE	Westinghouse PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M1	1.5V "A"		964			2IR			
M2	67.5V "B"			477			P45		

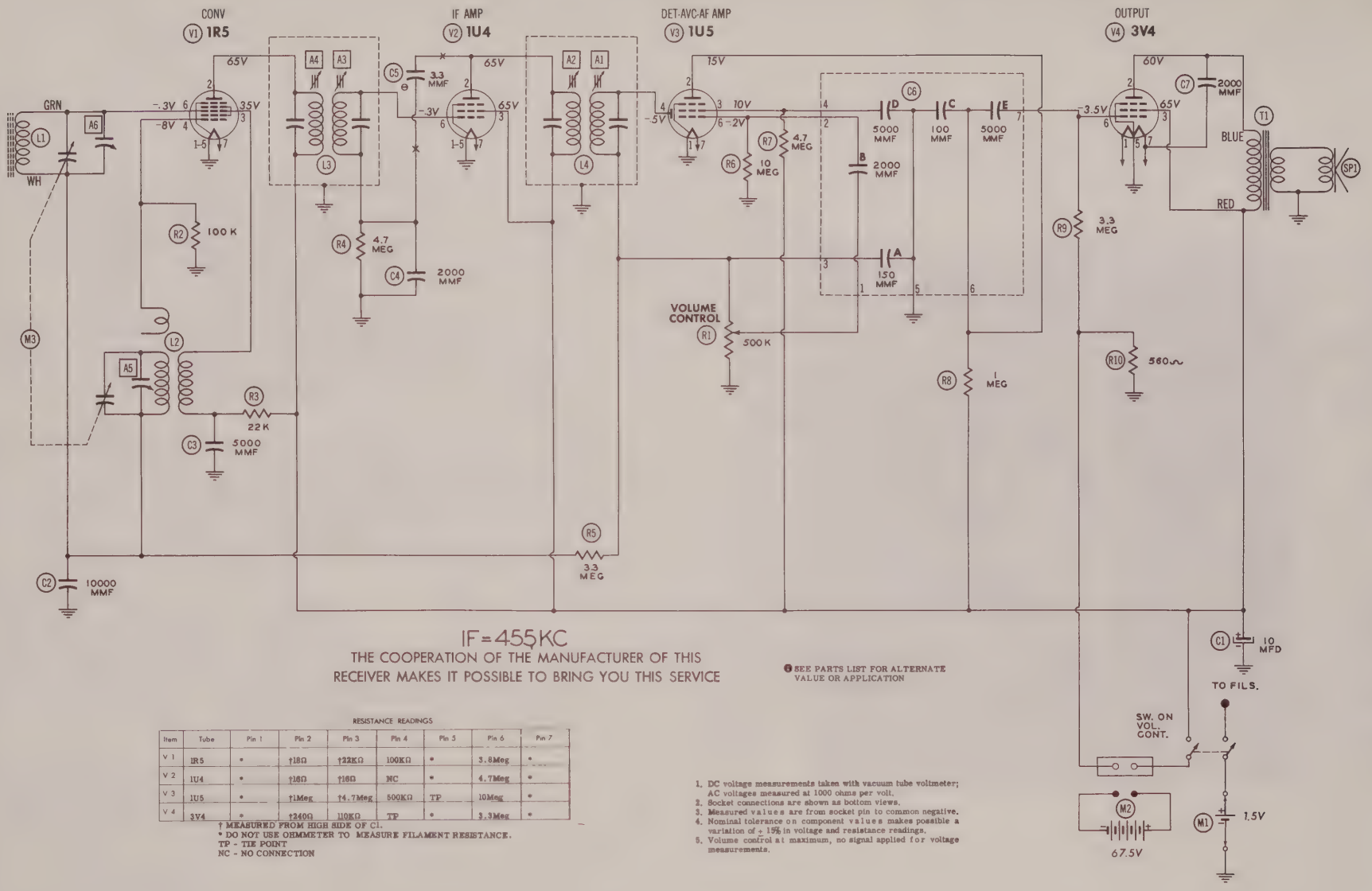
MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M3	Tuning Cap.	V-12291-2	2 Gang (11-240MMF, 9-90MMF)
	Cabinet	V-1409-5	Model H-511P4
	Cabinet	V-1409-6	Model H-512P4
	Cover	V-8884-5	Back - Model H-511P4
	Cover	V-8884-6	Back - Model H-512P4
	Knob	V-15454-3	On-off-volume - Model H-511P4
	Knob	V-15454-4	On-off-volume - Model H-512P4
	Dial	V-15389-3	Tuning - model H-511P4
	Dial	V-15389-4	Tuning - model H-512P4
	Handle	V-15352-5	Model H-511P4
	Handle	V-15352-6	Model H-512P4

CHASSIS—BOTTOM VIEW



WESTINGHOUSE
Model H-511P4



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

❶ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†18Ω	†22KΩ	100KΩ	*	3.8Meg	*
V 2	1U4	*	†18Ω	†16Ω	NC	*	4.7Meg	*
V 3	1U5	*	†1Meg	†4.7Meg	500KΩ	TP	10Meg	*
V 4	3V4	*	†240Ω	110KΩ	TP	*	3.3Meg	*

† MEASURED FROM HIGH SIDE OF C1.
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1955

298-13

ZENITH MODEL
T545 (Ch. 5T04)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ZENITH MODEL
T545 (Ch. 5T04)

TRADE NAME	Zenith Model T545 (Ch. 5T04)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	AC Operated Radio-Phono Combination AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp.-Phono Preamp., 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod.)	600KC	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	"	1400KC	1400KC	"	A6	"

FOR SERVICE INFORMATION ON ZENITH RECORD CHANGER UNIT S-14065-SEE SIMILAR RCA MODEL RP190 SERIES IN PHOTOFACT SET #144-FOLDER #7 OR RECORD CHANGER MANUAL CM-4.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

ZENITH
Model T545 (Ch. 5T04)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp. -Phono Preamp.	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp	12AT6	12AT6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rect.	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■80	150	22-2272	FP311.7	TM-804020-150	T-055	
B	▲40	150					
C	20	150					

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA				NOTES
	CAP.	VOLT.	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	
C2	.05	200	22-829	DF-503		PT415	
C3	100		22-5	DD-101	801-101	UC-531	
C4	.05	200	22-829	DF-503		PT415	
C5	.05	200	22-829	DF-503		PT415	Note 1
C6	10000		22-3	DD-103	811-01	DC511	
C7	.02	400	22-1379	DF-203	817-02	PT412	
C8	10000		22-3	DD-103	811-01	DC511	
C9	4700		22-4	DD-472	811-0047	DC525	
C10	.05	200	22-178	DF-503		PT415	
C11	470		22-6	DD-471	811-471	UC-5347	
C12	10000		22-3	DD-103	811-01	DC511	
C13	.01	400	22-1182	D6-103	GP3-333-103	PT411	
C14	10000		22-3	DD-103	811-01	DC511	
C15	.05	200	22-829	DF-503		PT415	

Note 1. Not used in some versions.

CONTROLS

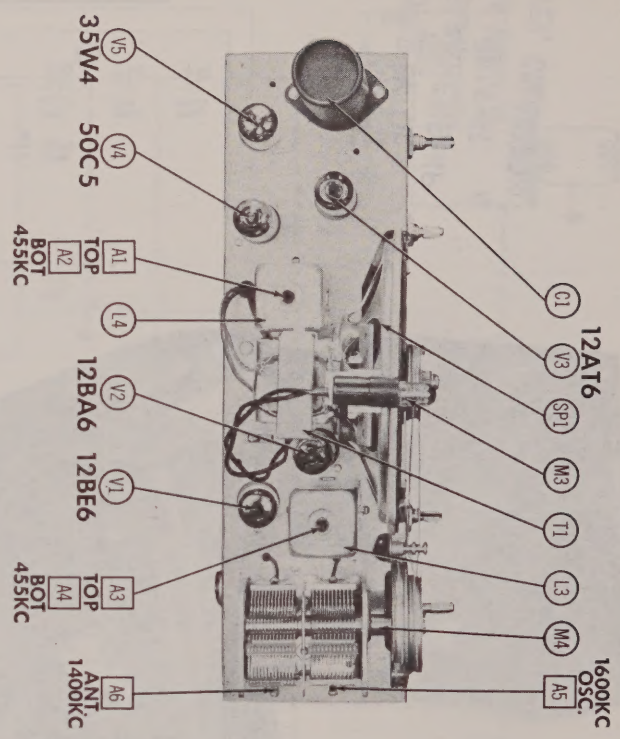
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	63-3280	Q11-133	A47-500K-S	AB-617	U-50	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A.
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A.
R2A	500KΩ	½	63-3283	Q11-133	A47-500K-S	AB-617	U-50	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A.

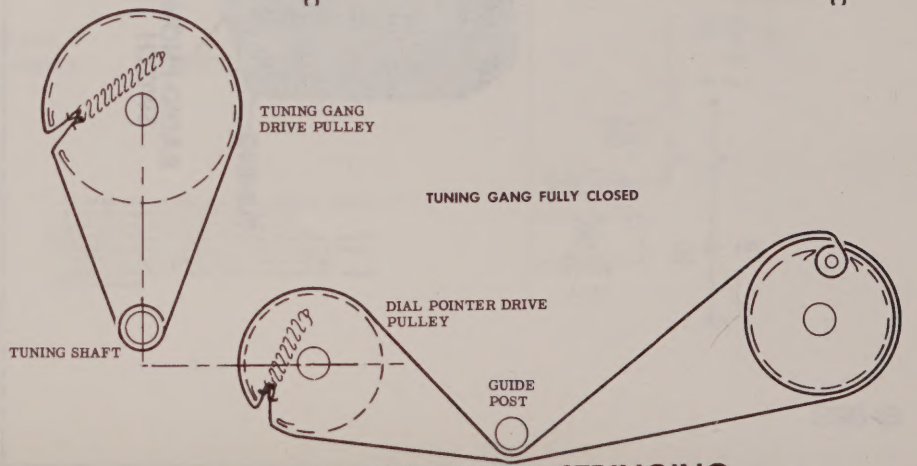
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R3	22KΩ	½	63-1842	BTS-22K	
R4	1000Ω	½	63-1786	BTS-1000	
R5	15Meg	½	63-1961	BTS-15Meg	
R6	2.2Meg	½	63-1926	BTS-2.2Meg	
R7	560KΩ	½	63-1901	BTS-560K	
R8	1.5Meg	½	63-1919	BTS-1.5Meg	
R9	100KΩ	½	63-1870	BTS-100K	
R10	47KΩ	½	63-1856	BTS-47K	
R11	68Ω	½	63-1736	BTS-68	
R12	10KΩ	½	63-1828	BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R13	4.7Meg	½	63-1940	BTS-4.7Meg	
R14	820Ω	½	63-1782	BTS-820	
R15	470KΩ	½	63-1898	BTS-470K	
R16	4700Ω	½	63-1814	BTS-4700	
R17	1500Ω	½	63-1793	BTS-1500	
R18	470KΩ	½	63-1898	BTS-470K	
R19	150Ω	1	63-1977	BTA-150	
R20	1000Ω	1	63-1574	BTA-1000	
R21	22Ω	½	63-1716	BTS-22	

CHASSIS—TOP VIEW





DIAL CORD STRINGING

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.5KΩ	3.5Ω	206-669	Z1001 ①	A-2928 ①	A-3876 ①	24S50 ①	S-1K ①	① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	5"	PM	3.5Ω	49.669	52A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1.1Ω		S-15896				
L2	Osc. Coil	1Ω	5.7Ω	S-22575	14-1040*	BC-387*	71-Osc.*	Core Part No. 149-85
L3	Input IF	16Ω	16Ω	95-1101	16-6666	BC-368	012-C1	
L4	Output IF	17Ω	17Ω	95-1102	16-6770■	BC-355■	12-C6■	

* Drill mounting hole.
■ Cut out center spade bolt mounting support & use adaptor plate.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	ZENITH PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		AC-J	A-1	44	0-1 or S-1	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGES NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

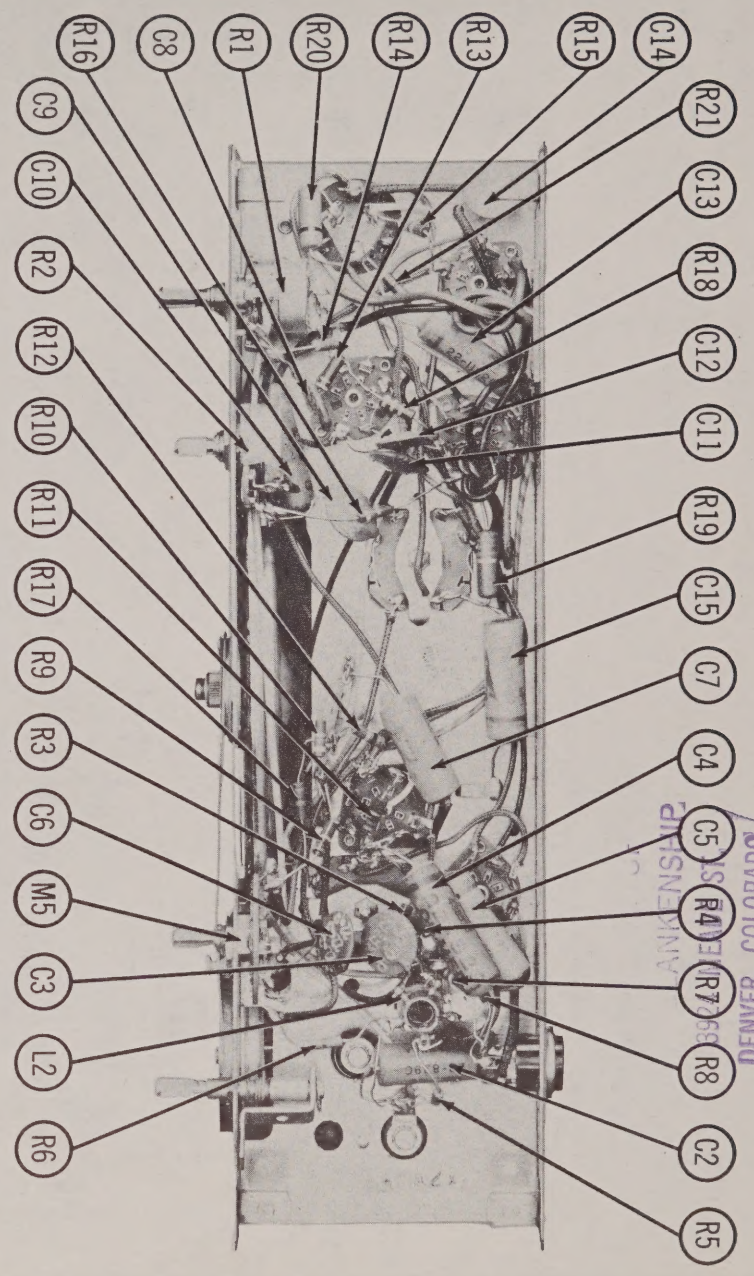
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	ZENITH PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		*M-75LP or †M-74LP or ♦M-74LPD	†A-398 ♦A-398D	†W-44MGS	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

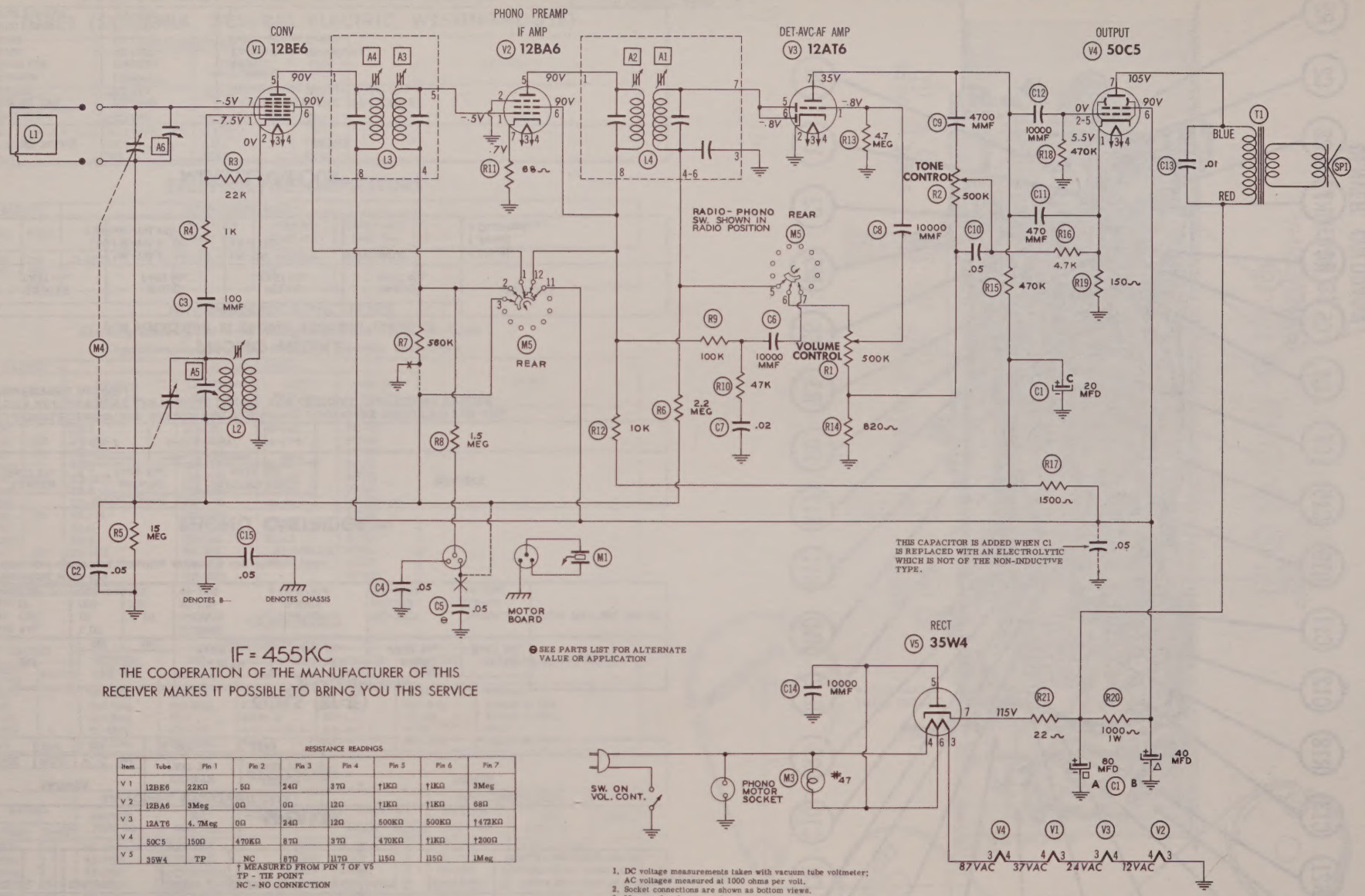
ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Dial Light	100-67	#47
M4	Tuning Cap.	22-2669	2 Gang (17-435MMF, 27-170MMF)
M5	Switch	85-563	Radio-Phono (Rotary-Wafer Type)
	Cabinet	14-1827	
	Knob	46-900	Tone
	Knob	46-1307	Tuning & on-off-volume
	Knob	46-1375	Radio-Phono Switch
	Dial Scale	26-541	
	Dial Pointer	59-229	

CHASSIS—BOTTOM VIEW



DENVER, COLORADO

ZENITH
Model T545 (Ch. 5T04)



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.5Ω	24Ω	37Ω	†1KΩ	†1KΩ	3Meg
V 2	12BA6	3Meg	0Ω	0Ω	12Ω	†1KΩ	†1KΩ	68Ω
V 3	12AT6	4.7Meg	0Ω	24Ω	12Ω	500KΩ	500KΩ	†472KΩ
V 4	50C5	150Ω	470KΩ	87Ω	37Ω	470KΩ	†1KΩ	†200Ω
V 5	35W4	TP	NC	87Ω	117Ω	115Ω	115Ω	1Meg

† MEASURED FROM PIN 7 OF V5
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1955